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Wages of Farm Labor

By C. L. Holmes
Division of Agricultural Economics

UNIVERSITY FARM, ST. PAUL

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WAGES OF FARM LABOR

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INTRODUCTION

The purpose of this bulletin is to analyze the wages of hired farm labor in Minnesota. This involves making comparisons by sections of the state and by systems of farming, and also tracing the changes in wage levels leading up to the present. Accounting for the sectional differences in wages has required some analysis of the various systems of farming in the state; and accounting for the shifts in wages has required an analysis of changes in the proportions of land, labor, and equipment, and the returns to these. This analysis is especially interesting during the last few years.

The collecting of the data for this study made necessary a comparison of three different methods of collecting wage data, (1) the method of reporters' estimates, used by the United States Bureau of Crop Estimates; (2) the census method, represented by the state census of 1920, made by the Minnesota State Department of Agriculture; and (3) the sample data method, represented by a special inquiry conducted by the Division of Agricultural Economics, assisted by the United States Bureau of Crop Estimates. For studying the first method, the Minnesota field agent of the Bureau of Crop Estimates furnished the actual schedules of the inquiry of December, 1919. The returns from the census method are available in the 1920 state census reports. The special inquiry used with the third method was sent to 7500 farmers who employed labor in 1919. More than 1500 of these replied, giving information concerning more than 2500 hired men. The returns were scattered fairly uniformly over the state.

CLASSIFICATION OF FARM LABOR

The importance in Minnesota farming of family and hired labor relative to the farmer's own labor is shown by the federal census. Table I shows the total number of farmers and farm laborers 16 years of age and older from 1880 to 1910. (See also Fig. I.) Altho the farmer himself still supplies the major portion of labor on Minnesota farms, the proportion supplied by his helpers has steadily increased as farming has shifted from pioneer conditions and the amount of farming business conducted by one man, and on a given area of land, has increased. Between 1880 and 1910 there was a shift of 14.2 per cent in the proportion between the number of farmers and the number of their mature

helpers.[1] This change is due partly to the gradual shift from almost exclusive grain farming to systems in which livestock enterprises, particularly dairying, form an important part, but more largely to the gradual adjustment in all types of agriculture to the most profitable size of business as measured not only in area of land used but in men employed and total funds invested. Compared with many other enterprises, the most profitable business unit in farming is not large as measured by the labor used, but it is undoubtedly larger than the one-man farm. Hence, as farming develops from the pioneer stage, there is normally a change not only in the direction of more careful and intensive use of the land, but toward a somewhat larger amount of labor under each manager. Along with these changes goes necessarily a considerable increase in the total investment necessary to carry on a farm business.

TABLE I

NUMBER AND CLASSIFICATION OF MALES 16 YEARS OF AGE AND OLDER ENGAGED IN AGRICULTURE IN MINNESOTA, 1880–1910

Date	Number			Percentage		
	Total	Farmers	Laborers	Total	Farmers	Laborers
1880	122,683	93,386	30,297	100	75.4	24.6
1890	168,552	116,851	51,701	100	69.3	30.7
1900	234,658	154,659	79,979	100	65.9	34.1
1910	255,022	156,137	47,837* 51,048†	100	61.2	18.8* 20.0†

* Hired men.
† Farmers' sons.

It is only with the census of 1910 that we get any measure of the relative importance of hired labor and that of the farmers' sons. In that year, agricultural laborers were reported as "on the home farm" or "working out." For Minnesota, these two groups were very nearly equal. (See Table I and Fig. 1.) There were about one hired man and one son 16 years of age or older at work on the home farm for every three farms in the state. If this additional labor had been distributed as evenly as possible among all the farms, 57,252 or approximately one third of the farms, would have been operated by the owners alone, while the remaining 98,885 farms would each have had one additional laborer.

It is to be kept in mind, however, that these census figures were collected in the spring and therefore could have included only a small part of the great body of transient laborers who enter the farming sections

[1] Women, and children under 16, are omitted from these figures, but it is not likely that the proportion of such labor has changed greatly.

of the state for harvest, threshing, and other fall work, and who, in view of our prevailing type of agriculture, constitute almost as important an element in the farm labor supply as do the hired men who work by the season or year.

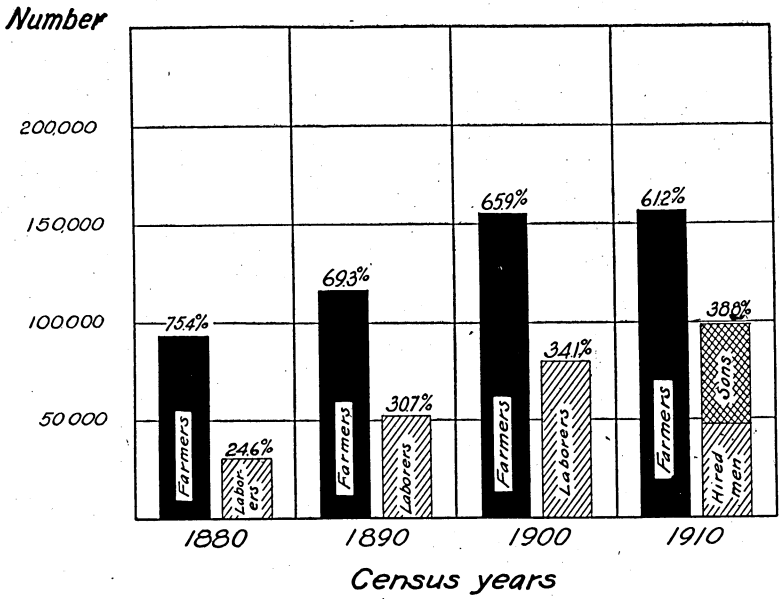

Fig. 1. Number and Classification of Males 16 Years Old or Older Engaged in Agriculture in Minnesota, 1880-1910

Farm laborers were increasing more rapidly than farmers during each decade. However, most of the farm work is still done by the farmers themselves.

RELATION OF TYPES OF FARMING TO WAGES

Before attempting to analyze wages for the season of 1919, particularly the sectional variations in wages, we must know something about farming conditions in the various parts of the state. There are in the North Central states at least three well-defined systems of agriculture. These are (1) corn-and-livestock or Corn Belt farming, centering in Iowa and Illinois; (2) small-grain farming, centering in North Dakota; and (3) dairying, centering in southern Wisconsin.

Located between the centers of these types of agriculture, Minnesota is the meeting ground of all of them. A large part of the state is the transition zone between the well-defined type areas of neighboring states. Hence, except in the northwestern part, types of farming do not stand out distinctly. There are enough differences, however, to affect greatly the labor problem, and it is therefore important to point them out as far as possible and to outline as accurately as may be the geographical limits of the several types of farming. These limits were originally

drawn on the basis of the 1910 U. S. Census reports but they have been checked against the 1920 census data and all changes since 1910 are carefully pointed out in the page following. Figure 2 shows the relative acreage of the various crops in each of the counties of the state. The size of the circles represents the average area per farm of all crops,

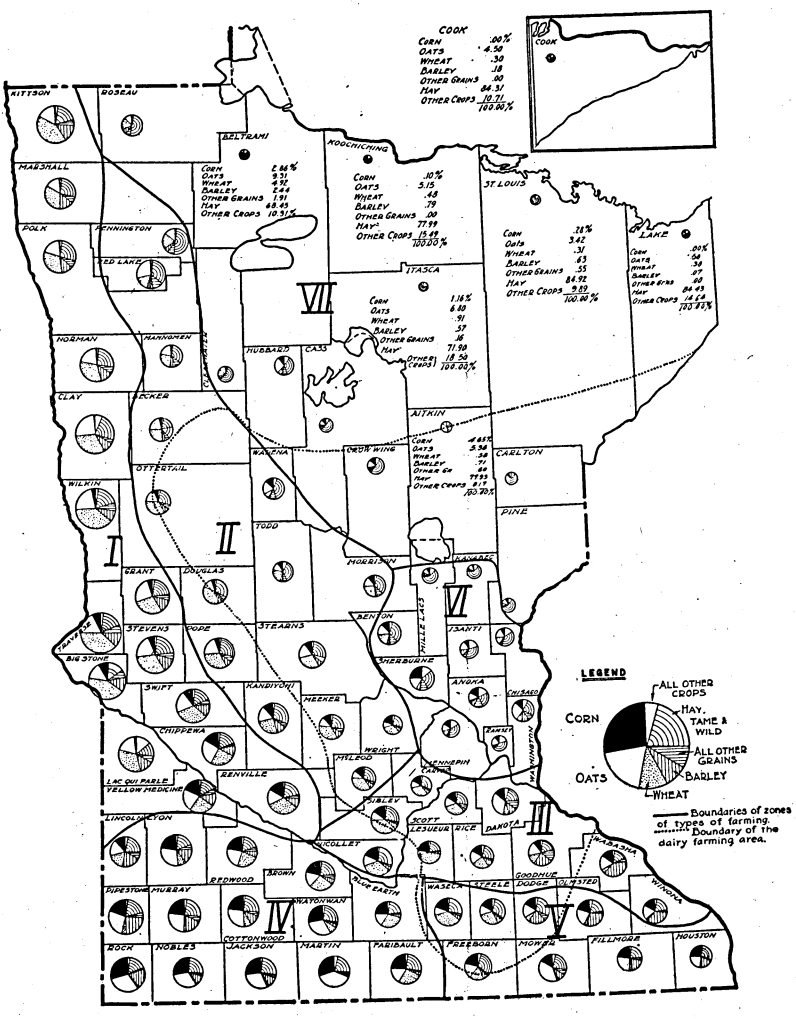

Fig. 2. Crop Acres per Farm and Percentage in Various Crops, by Counties, 1909

The heavy lines are the boundaries of the type-of-farming sections numbered I to VII described in the text. The dotted line indicates the limits of the area in which dairying was most important according to the 1920 U. S. Census.

including tame and wild hay but excluding pasture. The sectors within the circles show the average percentage of this total area occupied by the different specified crops. Such a map reveals the geographical variations in the type of farming as far as they can be revealed by cropping systems, but it shows nothing as to livestock enterprises except as inference may be drawn from the crops grown. To supplement this map,

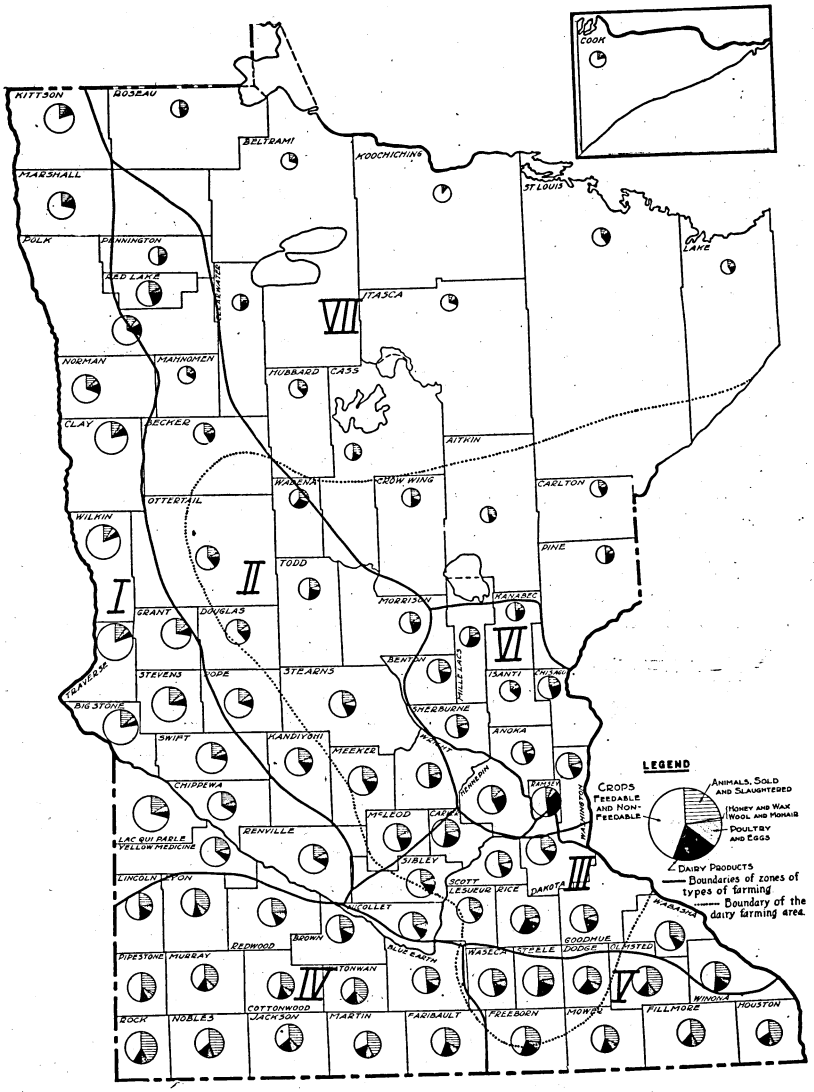

Fig. 3. Gross Income per Farm and Percentage Derived from Various Sources, by Counties, 1909

Type-of-farming areas are outlined as in Figure 2. Note the varying importance of small grains, dairy products, and livestock as sources of income in the several parts of the state. The largest average gross income per farm was in Traverse County and was $2353.

Figure 3 was constructed, showing by counties the relative average size of the farmer's gross income for 1910 and the average percentage of it coming from different specified sources in each county. Not enough of the 1920 census data are available for a new analysis of sources of income, but those that are available indicate that the map is sufficiently accurate for the purpose in mind. This classification of the sources of income is not as detailed as might be desired. For example, the census does not separate the receipts from different classes of livestock. As it stands, however, the gross receipts map shows very strikingly the regions where cash crop production overshadows other enterprises, where dairying is important, and where the sale of meat animals figures largely as a means of disposing of crop products.

On the basis of these two maps and such supplementary information as was available, the state has been rather tentatively divided into the seven more or less distinct type areas outlined on the maps presented in the bulletin. Following are brief descriptions of the type of agriculture and its effect on the farm labor problem in each of these sections.[2]

SECTION I. NORTHWEST SMALL GRAIN SECTION

This section, which includes the Minnesota portion of the Red River Valley and the upper part of the Minnesota River Valley, is the most clearly defined farm type area in the state. There is a high degree of uniformity in selection of crops, methods of crop disposal, seasonal demands for labor, and the organization of the farm business generally.

Owing to the great importance of small grain, the type of farm organization in these counties is one in which a large amount of land and a comparatively small amount of labor is used.

Moreover, the seasonal distribution of labor is very uneven. (See Fig. 4.) There is a rush season in the spring, occasioned by seeding a big acreage, in which all the labor is practically that of handling teams and machinery. This is followed by a slack period while the grain is growing and ripening. Then comes the harvest and threshing season in which there is a great deal of hand labor, as well as team and machine

[2] This division of the state does not designate any portion as a distinct dairy section. The 1910 United States census revealed no counties where dairy products were the leading source of farm income and where the farm organization centered unquestionably in the dairy enterprise. However, between 1909 and 1919, dairying increased in importance in Minnesota. One set of figures shows that there were 71 dairy cows for every 1000 acres of improved land in Minnesota in 1919 as compared with only 55 in 1909. That these figures are not exactly comparable is evidenced by another set of figures which show 22.1 gallons of milk per improved acre in 1919 compared with 20.4 gallons in 1909. The census bureau used a new definition for dairy cow in 1919. In Figures 2 and 3 a dotted line has been drawn to include that part of the state which may be called the dairy section. Within this area in 1919 at least 90 dairy cows were kept for every 1000 acres of improved land, or the receipts from dairy products were at least $4 per improved acre, or the milk production was at least 22 gallons per improved acre. In drawing this line due allowance was made for the pasturage obtained from unimproved land in the northern counties.

work, in which the regular labor force must be supplemented by day laborers, hired at high wages and for a comparatively brief period. While many farmers operate farms so large that they need hired help through the entire season, practically all of them are dependent on casual labor during the late summer and early fall. This labor is recruited from the so-called casual labor class who drift from place to place and from job to job. Frequently they are industrial laborers a part of the year. Depression in industry may create an oversupply; and prosperity in industry a scarcity.

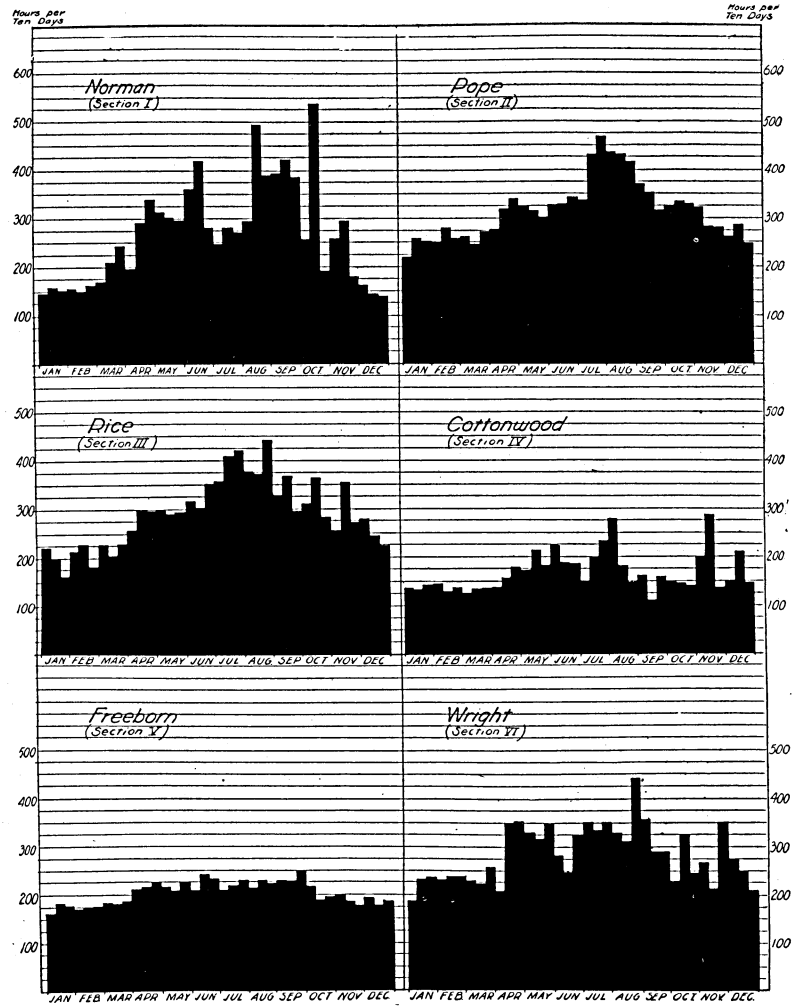

Fig. 4. Seasonal Distribution of Labor by Ten-Day Periods on Specific Farms Located in Six of the Type-of-Farming Sections

Farmers in regions where the seasonal distribution of labor is very uneven normally pay more for their hired labor because wages tend to be highest when the demand for labor is greatest. (See Table VIII.)

SECTION II. CENTRAL SMALL GRAIN SECTION

This section differs in its farming from Section I principally because of a higher proportion of untillable land which has to be utilized for pasture and hay. This gives livestock a larger place in the farming. Since the farms are smaller, the farmers and their families more nearly supply the needed labor. Likewise the substitution of livestock for small grain makes the seasonal distribution of labor demand somewhat more even and reduces the demand for extra help in harvest. The labor problem is for these reasons appreciably less acute here than in the more highly specialized small grain area.

SECTION III. SOUTHEASTERN SMALL GRAIN SECTION

The line separating this section from Section II, as shown in Figures 2 and 3, is rather arbitrarily drawn, tho conditions within the two sections are distinctly different except on the margin. The land is of better quality in this section and its nearness to St. Paul and Minneapolis affects the agriculture considerably. Tho small grain is the most important product, livestock, particularly dairy cattle, holds a large and growing place in the farming system.

Because of the greater importance of corn and livestock, and particularly because of the dairy work, the need for labor is continuous throughout the year and subject to less seasonal variation than in the other small-grain regions. Further, because the farms are larger and have more livestock, they require much more farm labor. More of it, however, is hired by the year than in the other two sections.

This type of farming, moreover, requires a better class of laborers than is needed in simple grain farming. Dairying and other livestock work require more skill, better judgment, and greater trustworthiness than the handling of teams and implements. Fortunately this type of farming tends to keep in local employment a larger proportion than usual of the young men trained in the local farm practice and hence well suited to the local farm work.

SECTIONS IV AND V. CORN AND SMALL GRAIN SECTIONS

The agriculture of the southern portion of Minnesota has been greatly affected by the gradual increase in the corn acreage. The northern boundary of these two sections as given on the maps was determined for the most part by the 20 per cent corn line. That is, almost all the counties in which corn, according to the 1910 census, occupied 20 per cent or more of all the land in crops, including hay, were placed in these two sections. By 1919, however, this line had shifted northward considerably—Yellow Medicine, Renville, Chippewa, Nicollet, and Le Sueur counties had more than 20 per cent of crop land in corn.

In 1909, corn occupied 24 per cent of the crop area in Section IV and only 19 per cent in Section V; and in 1919 the percentages were 27 and 18 for the two areas. On the whole, livestock is considerably more important as compared with crops in Section V than in Section IV.

The farm labor problem is also different in these two sections. There is a larger demand for hired labor in Section IV because the farms are larger, the typical farm being from 225 to 300 acres with from 200 to 275 acres improved, while in Section V the typical farm is not over 160 acres with from 90 to 100 acres improved. In Section IV, therefore, much labor must be hired. The dairying in Section V requires much more labor in proportion to the area occupied, particularly for the work which lasts throughout the season or year, than does the raising of cash grain and meat animals, but it is of a kind that can be done to a large extent by the farmer and his family. In Section IV, the seasonal demand for labor is not greatly different from that of Section I, for the acreage of small grain per farm is large, notwithstanding the importance of corn and livestock. The seasonal labor demand of Section V resembles that of Section III. (See Fig. 4.)

SECTION VI. POTATO, TRUCK, AND HAY SECTION

Physical and economic conditions combine to make the agriculture of Section VI distinct from that of all other parts of the state. Altho dairying is a profitable enterprise and considerable income is secured from the sale of cattle and some swine, crops are the most important source of income.

The labor problem in this region is somewhat unusual. The seasonal demand for labor is very irregular. There is a little call for extra labor in grain harvest, but the heaviest demand comes with the potato harvest in September. The truck farmers need large amounts of labor at various times during the season for hand work in planting, weeding, hoeing, and harvesting their products. For much of this labor they depend on boys and men from the cities. The farms are small, and hence few year-round men are needed.

SECTION VII. THE UNDEVELOPED SECTION

The northeastern two-fifths of the state has been arbitrarily included in a single type of agriculture. For the purpose of this bulletin, this is sufficiently accurate. Some differences are already to be noted in the sort of farming practiced in the different settlements, but these do not affect the labor problems greatly.

Hired farm labor is not a matter of much importance in this region. There are a few large farms where help is kept, but for the most part

TABLE II

RELATIVE IMPORTANCE OF THE SEVERAL TYPES OF FARM LABOR CONTRACTS IN MINNESOTA, 1919

Types of contracts	Number of contracts								Percentage of total number							
		Sections								Sections						
	State	I	II	III	IV	V	VI	VII	State	I	II	III	IV	V	VI	VII
By the month for the year....	318	72	51	48	64	39	26	18	12.8	9.2	13.5	17.5	15.1	14.4	14.9	8.9
By the month for the season...	563	166	72	61	138	66	29	31	22.4	21.2	19.1	22.3	32.5	24.4	16.6	15.3
By the month for first half of the season.....	120	38	27	17	19	9	6	4	4.8	4.9	7.1	6.2	4.5	3.3	3.4	2.0
By the month for second half of season	153	43	28	20	30	18	6	8	6.1	5.5	7.4	7.3	7.1	6.6	3.4	3.9
By the month for the winter....	146	40	28	16	24	26	6	6	5.8	5.1	7.4	5.8	5.6	9.6	3.4	3.0
By the day for harvesting, threshing, silo filling, etc....	728	310	103	65	104	63	30	53	29.0	39.6	27.2	23.7	24.4	23.2	17.2	26.1
By the day for other work....	480	113	69	47	46	50	72	83	19.1	14.5	18.3	17.2	10.8	18.5	41.1	40.8
Total	2508	782	378	274	425	271	175	203	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

the settler and his family do all the work except for short periods when special work may require outside help. This results in most of the hiring being by the day rather than by the month.

The small volume of the farm business on the typical settler's farm makes the farmer himself a hired man for a considerable portion of the year. He works in the lumber camps, the sawmills, and even in the North Dakota wheat fields, in order to supplement the farm income in the years when he is "making" his farm.

FARM WAGE CONTRACTS IN 1919

Two of our sources of information furnish data on the relative number of hirings for different lengths of time or for different parts of the year. The Minnesota state census blank contained two inquiries on farm labor. The first asked the monthly wage rate paid in summer and the second the monthly wage rate paid in winter for the year 1919. The comparative number of farmers answering the first and the second of these questions may be taken as a measure of the relative demand for hired help during the crop growing season and the winter months. (See Table VI.) In the special schedule of inquiry on farm labor sent to farmers, the correspondents were asked to report the actual dates between which the men were employed and the time unit, as month or day, on which wages were based. The results of this are given in Table II.

In general, the greater the permanence of the work and the more evenly distributed the labor demands, the longer the term of the contract. Farmers seek to save expense by hiring only for the part of the year when help is needed, provided the slack time is not so short as to make the saving not worth while. Hiring by the year indicates a type of farming in which livestock enterprises are so important that hired labor is needed during the winter months when no field work can be done. Such hiring is most frequent in well-developed dairy sections. A more common type of labor bargain is one which covers only the crop season beginning about the first of March and extending to the first or the middle of November. This kind of hiring along with day hiring prevails in sections where the farming is based primarily upon crop enterprises. Still another kind of contract is that covering labor for the winter months. This, presumably, is supplementary to the season contract, the two together being equivalent to the year-round term. This arrangement may be more satisfactory in some cases because it gives a better opportunity to adjust the wage to the relative value of the hired man's time at the different seasons of the year and to differences in the supply of labor. Hours of labor are commonly somewhat shorter and the supply of laborers is greater in the winter, and the wages paid on these winter contracts are almost invariably

lower than for the crop season or year. Such an arrangement is desirable if there is danger that the hired man will break his year contract in the spring, or that the employer may arbitrarily dismiss his man with the close of the crop season.

A still further adjustment in this direction is to be found in the spring and fall contracts, numerous cases of which were found in this investigation. Under this arrangement, help for the first half of the crop season—say from March 1 to July 1—would be contracted for at one wage level. This would be supplemented with another contract, often with the same man, at a considerably higher figure for the remainder of the season. The greater demand for labor in the latter half of the season, with a resulting higher scale of wages, makes this adjustment desirable if the laborers can not be depended upon to keep their contracts. A few cases were found in which a different wage rate was arranged for practically every month of the season.

In all the foregoing types of contracts, the unit of time on which payment is based is the month. This time unit is the basis for practically all the more permanent classes of wage agreements where the work is such that the farmer needs continuous help over a considerable period. Under this arrangement, no payment is ordinarily deducted for loss of working time due to unseasonable weather, breakdown of machinery, and the like. The rate is somewhat lower than where these deductions are made, even tho the efficient farm manager may be counted upon to have a variety of tasks planned to take the time of his men in such emergencies. For special work of short duration, such as harvesting, threshing, silo filling, and construction work, the time unit is almost always the day. Wages are at a somewhat higher rate and time is regularly counted only when the special tasks are under way. Frequently the farmer boards these special laborers during interruptions from rain or other causes in return for part time incidental work.

Tables II and V contain the available evidence as to the relative importance of these various types of wage contracts in the state. Table VI (see page 20), made up of figures from the state census, has the advantage of being based on a complete canvass of all the farmers in the state, and the disadvantage of showing only two types of contract, summer and winter. Table II contains figures on a much larger number of types of contracts, but is based on the returns of only about 1500 farmers.[3] The discussion following is based on these 1500 returns.

This inquiry shows that for the state as a whole, month and day labor are of almost equal importance so far as the relative number of

[3] This is approximately one per cent of the whole number of farmers in the state. By this method one is able to get very much more detailed information than can ordinarily be obtained from a broader inquiry like a census. The danger is that his returns may not make a fair sample. However, it is believed that the number of farmers returning information in this inquiry is sufficient to be fairly representative.

hirings are concerned. Of the 2508 hired men reported, 1300, or approximately 52 per cent, were engaged by the month, and 1208, or 48 per cent, were paid by the day. Of course, in amount of work done, the month men are much more important. Of the month men, those hired for the season are most numerous, followed by those hired by the year. Relatively few are hired for the winter months only, or for the first or second half of the crop season. Of the day men, those hired for work in harvesting and caring for crops are 50 per cent more numerous than those engaged for other work. Those hired by the day for "other work" were for the most part engaged in the spring months, and the work was very largely clearing and preparing land. The cases of all special artisans, such as carpenters and masons, were excluded from the figures in order to restrict the study to ordinary farm work.

When these figures are examined for the various types-of-farming sections, many significant variations are found. For example, the number of day contracts reported is greater than the number of month ocntracts in Sections I, VI, and VII, but fewer than the number of month contracts in the other four sections. This is accounted for in Section I by the large amount of extra harvesting and threshing labor needed to care for the small grain crops. Three times as many day hands were hired for this sort of work as for other day work. In Sections VI and VII the excess of day laborers over month laborers is due not so much to harvest work as to other special work of short duration. In Section VI this special work is largely on truck crops, while in Section VII most of the farms are operated on such a small scale that it does not pay to keep hired help continuously, so that day labor tends to be the prevailing type for the whole area. This is clear from the figures in Table II. In Sections II, III, IV, and V, the excess of month contracts over day contracts is due (1) to livestock farming and types of cropping which go with livestock farming, all of which make for more continuous and less irregular demands for labor, and (2) to the larger farms and farm business, which require a larger proportion of hired help.

As for the month contracts, almost twice as many are for the season as for the year. Hiring by the year is more frequent in Sections II, III, V, and VI, where dairying is most important, than in Sections I and IV.

Another method of hiring farm work done, not indicated in Table II but nevertheless of some importance in the state, is that of paying on a piece-work basis. Corn husking, corn shelling, and the threshing of small grains are paid for by the bushel. Certain field operations,

such as cutting grain and plowing with a tractor, are paid for by the acre. This type of hiring, like hiring by the day, is resorted to in the case of special tasks of short duration. Data were not collected on piece-work rates.

FARM WAGES IN 1919

The farm labor situation existing in 1919 was in many respects abnormal. The war had greatly increased the production of some farm products to the curtailment of others, and this abnormal crop situation still existed in 1919, as evidenced particularly in the high acreage of wheat. It was during this season that prices on general commodities were advancing most rapidly and producers in nearly all non-agricultural lines were bidding strongly for labor. The normal supply of farm labor was greatly depleted by the war, and altho by the spring of 1919 demobilization was nearly completed, many thousands of former farm hands had not yet settled down in their old surroundings. The supply of farm labor was therefore very short. It was still short in the spring of 1920. Wages for the approaching crop season promised to be higher than most farmers could afford to pay. There was widespread apprehension of a serious reduction of crop acreage. Some creditable authorities went so far as to predict an acute food shortage.

THE WAGE LEVEL

One of the things attempted in this bulletin is to determine what may be called the level of wages for farm labor in different sections of the state and at different seasons. This introduces the idea of a "wage level," which probably needs to be explained. The level of wages for labor, like the level of prices for wheat, grows out of supply and demand. The only real demand for farm labor comes from those farmers who stand ready to pay a given known wage; and the only real supply is made up of the labor of men who, in view of all their other opportunities for employment, stand ready to accept farm work at a given wage. The wage level of any given season is the result of a balancing of what employers will pay and what the men will take. Both the wages offered by the farmers and the wages asked by the men affect this balancing point. There are marked differences between farmers as to how high a wage they can safely pay. These differences are due mainly to the relative business ability of the farmers and to differences in the type of farming. Similarly, there are differences in the minimum wage of the various farm laborers because not all laborers have equal opportunity and equal ability to take up other lines of occupation. This whole situation may be illustrated by means of assumed figures of wages and labor demand and supply at various

wage levels. Suppose that in a certain county the number of jobs actually open and the number of men actually willing to work at various wage levels from $20 to $90 per month, are as follows:

Wages per month	Number of jobs open	Number of laborers ready to work
$20	175	10
30	125	40
40	110	75
50	100	100
60	90	110
70	80	120
80	60	130
90	40	145

Under these assumed circumstances, if wages were $20 per month, 175 men would be wanted with 10 available, while at $90 only 40 jobs would be open and 145 men willing to work; but at $50 per month just as many men are ready to work as there are jobs to fill, and wages in that county for the particular kind of work in question are established at about $50 per month.

The wage level for a state, however, or even for a neighborhood, is not so definitely determined as the foregoing would indicate. There are many different kinds of work for which men are hired and many different grades of men seeking work, and these differences make for variations in wages. Further, the farmers seeking to hire men and the men looking for jobs do not all get together at one bargaining place as do the buyers and sellers of produce in a market. Hence, competition in the labor market has less chance to reduce all wage bargains to a common level than is true in the buying and selling of goods.[4] In Table IX (page 32), showing day wages by weeks for the entire season of 1919, there is a wide difference between the lowest and the highest wages paid. Table III shows a similar situation with reference to the wages of men hired by the month for the season. In this table the data are divided according to type-of-farming sections, but even within these narrower geographical limits, the range of wages is wide. Even within a township, there would be a considerable range.

On the other hand, these tables show an unmistakable tendency toward the establishment of a definite wage level. Very few men are hired at the extremely low figures and comparatively few at the highest figures. The point between these extremes at which most of the hiring is done, may fairly be taken as the level toward which wages are tending.

[4] The fact that a wage contract is normally for a period of time—a month, a season, or a year—tends also to prevent a perfect adjustment of all wages for a given kind of labor to a common level. The longer the term the further a wage determined by past forces is projected into the future and the further above or below subsequently determined wage levels it will be.

In other words, it is the real wage level. During many weeks, there are two or more wage points at which much hiring is done. There seems, therefore, to be more than one level. This may be accounted for in the case of day labor in several ways. It may represent the difference in wages for different kinds of work at the same time, different wages for the same work in different parts of the state, or a difference in the quality of the men with respect to the work they are doing.

TABLE III

NUMBER OF MEN REPORTED HIRED BY THE MONTH FOR THE SEASON AT THE SEVERAL WAGE LEVELS, MINNESOTA, 1919
(Sample data)

Wage group	State	Type-of-farming section						
		I	II	III	IV	V	VI	VII
$22.50–$27.49	1	..	..	..	..	..	1	..
27.50– 32.49	1	..	..	..	..	..	..	1
32.50– 37.49	5	..	..	1	1	2	..	1
37.50– 42.49	20	6	..	6	2	1	2	3
42.50– 47.49	24	3	6	2	3	5	5	..
47.50– 52.49	141	37	19	14	34	17	7	13
52.50– 57.49	51	24	7	8	4	6	..	2
57.50– 62.49	123	33	15	16	35	15	4	5
62.50– 67.49	71	22	10	8	13	8	8	2
67.50– 72.49	24	3	7	..	6	5	2	1
72.50– 77.49	35	12	3	2	15	1	1	1
77.50– 82.49	14	3	1	1	7	..	2	..
82.50– 87.49	9	1	1	2	5	..	..	..
Wage per month	58	59	58	57	61	56	55	54

These two tables also reveal in a striking way the shifts in the wage level. Table IX shows such shifts with the seasons. Evidently the level rises decidedly as the season advances until the peak of the harvest season is reached, and then declines. Table III shows that wages may be at one level in one part of the state and at an entirely different level in the same season in other parts.

The figures cited would seem to show that, notwithstanding the various opposing circumstances, there is a tendency toward a common wage level and that this level moves up or down in response to the influences already mentioned.

WAGE DATA FOR 1919

Reference has already been made to the sources of information on farm wages for the season of 1919. Table IV gives the results of the 1500 returns received from employing farmers. It presents, by sections and for the state as a whole, the wages for all the types of contracts already described as well as the averages of the farmers' estimates of the value of the board and other non-money payments included in the hired man's total wage.

TABLE IV

AVERAGE RATES OF FARM WAGES IN MINNESOTA FOR 1919

(Sample data)

Type of contract	State	Type-of-farming sections						
		I	II	III	IV	V	VI	VII
By the month hired for the year	$55.00	$57.00	$54.00	$53.00	$55.00	$55.00	$56.00	$56.00
By the month hired for the season	58.00	59.00	58.00	57.00	61.00	56.00	55.00	54.00
By the month hired for first half of season	53.00	54.00	52.00	43.00	60.00	54.00	48.00	57.00
By the month hired for second half of season	71.00	72.00	75.00	69.00	71.00	64.00	65.00	72.00
By the month hired for the winter	36.00	28.00	38.00	34.00	46.00	38.00	38.00	42.00
By the day hired for harvest, silo filing, etc.	4.75	5.00	4.25	4.75	5.00	4.25	4.00	4.00
By the day for other work	3.00	3.00	3.00	3.00	3.50	3.00	3.25	3.00
Value of board, etc., per month, month contract	24.00	26.00	25.00	23.00	27.00	25.00	21.00	24.00
Value of board, etc., per day, day contract	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TABLE V

ESTIMATED WAGES OF FARM LABORERS IN MINNESOTA FOR 1919
(Bureau of Crop Estimates, U. S. Department of Agriculture)

Type of contract	State	Type-of-farming sections						
		I	II	III	IV	V	VI	VII
By the month, hired by the year with board	$54.00	$57.00	$51.00	$52.00	$55.00	$58.00	$52.00	$52.00
By the month, hired by the year without board	75.00	77.00	74.00	75.00	75.00	80.00	76.00	70.00
By the day hired for harvest with board	4.50	5.00	4.00	4.75	4.75	4.50	3.75	3.30
By the day hired for harvest without board	5.00	6.00	4.75	5.50	5.75	5.25	4.50	4.00
By the day hired for other work with board	3.50	3.75	3.25	3.50	4.00	3.75	3.00	3.00
By the day hired for other work without board	4.25	4.75	4.00	4.25	4.75	4.00	4.00	4.00

TABLE VI

AVERAGE RATES OF FARM WAGES IN MINNESOTA FOR 1919 AS REPORTED BY THE STATE CENSUS OF 1920

Type of contract	State	Type-of-farming sections						
		I	II	III	IV	V	VI	VII
Hired for the summer, number of farmers reporting	40,753	10,074	8,028	6,268	7,192	3,876	3,449	1,866
Hired for the summer, wages per month	$60.00	$58.00	$61.00	$59.00	$63.00	$58.00	$61.00	$64.00
Hired for the winter, number of farmers reporting	11,815	2,352	2,464	2,417	1,320	1,325	1,228	708
Hired for the winter, wages per month	$42.00	$40.00	$40.00	$39.00	$43.00	$39.00	$45.00	$57.00

Table IV gives the results of the estimates of the prevailing rates of wages in 1919 made by 350 farmer correspondents of the Bureau of Crop Estimates of the United States Department of Agriculture. These are represented in the form of averages for the same geographical divisions as are followed in the former table. The wage is reported in terms of the amount of cash paid both with and without board. Only a few types of contracts are included.

Figures derived from the report of the state census are given in Table VI. In this report we have but two types of contracts, those for men hired for the summer and those for men hired for the winter, both on the month basis of pay. Presumably the summer wage as given in reply to the census inquiry covers practically the same portion of the year as the season rate given in the replies to the special inquiry. The winter contracts reported in both should cover practically the same months of the year; however, it appears that many month wage rates on year contracts were included in the state census figures. In this census, nearly 41,000 farmers hiring for the summer and nearly 12,000 hiring for the winter reported their wage rates. This, presumably, includes all farmers who hired labor by the month that year, except a comparatively small number whose replies indicated that they had misunderstood the questions.

The rates given in these tables do not include the farm laborer's board and lodging and other extras. It is so commonly understood that a farm hand is to receive board and lodging in addition to his money wage that it is frequently not mentioned in the bargaining. Other compensations in the nature of personal service, such as washing and mending, are not so uniformly included, and if received are usually specified in the agreement. The returns from farmers on this point mentioned a variety of items not uniformly received. A frequent one was the keeping of the hired man's driving horse or the use by the hired man of the farmer's driving horse and buggy, and in at least two cases the use of an automobile was specified as a part of the hired man's compensation. The significance of these non-cash elements in the wage of the farm laborer is too frequently lost sight of in wage discussion. The farmer himself frequently underestimates their actual value, and the hired man and others, in comparing farm wages with those in other industries, fail to give them due weight.

COMPARISON OF METHODS OF SECURING WAGE DATA

Before discussing the significance of the wage figures given in Tables IV, V, and VI, it may be well to give a brief description of the methods followed in gathering and compiling the data for each table, and to compare the results secured from each. The sample-data method,

used in obtaining the material for Table IV, consists in getting as accurate information as possible from a limited number of cases selected at random from the whole number, the idea being that this limited group or "sample" will be representative of the whole body, and that therefore the things which are true of the sample will be approximately true of the whole group. If the sample is sufficiently large and sufficiently representative, the averages or other statistical expressions derived from it will approximately equal similar ones derived from the complete data. The advantage of this method is that it is inexpensive because it avoids the vast amount of work necessary to gather and compute the complete data. An investigation by this method may include many more details, because with only a fraction of the actual cases to handle, the analysis may be much more nearly complete. The danger is that the sample may be too small or may represent only a part of the cases. The data may be gathered by an enumerator who goes personally to those having the facts, or it may be secured through correspondence by mailing a schedule of inquiries to the informants to be filled out and returned.

The estimate method, which is the basis of Table IV, consists in securing from a limited number of persons, presumed to be familiar with the facts, their judgment as to these facts, either in absolute figures or in terms of percentage of change from conditions as they existed in the past or exist in some other locality. It is by this method that the Bureau of Crop Estimates of the United States Department of Agriculture gets practically all its figures on the acreage, yield, and value of crops and the number and value of livestock. It has the advantage of being very inexpensive, and has generally been regarded as the only practical method by which to obtain figures on such a large number of items so frequently and for such a large area as is undertaken by the Bureau of Crop Estimates. It has the disadvantage of yielding figures based on no actual cases, but on the estimates of persons as to what the usual or representative conditions are.

The third method is that followed by the United States Census Bureau, the various state census authorities, and those employed to make enumerations of property for purposes of taxation. It is necessarily very expensive and for this reason is usually restricted to the gathering at rather infrequent intervals of a few general data on matters of interest to a large number of people, like the federal and state census data, or to the getting of facts such as must be known for each individual, as for the purpose of taxation. For these reasons it does not lend itself well to the securing of facts in minute detail. The information is secured by enumerators who fill in a printed schedule of inquiries for each informant and who visit all persons within the given political unit. Table VI is based on this sort of enumeration.

TABLE VII

COMPARISON OF FARM WAGE AVERAGES FOR 1919 AS SECURED BY THREE METHODS OF INQUIRY

Area	Average monthly wage for year contracts, as secured by			Average monthly wage for summer as secured by		Average monthly wage for winter as secured by		Average daily wages for harvest work, as secured by		Average daily wages for other than harvest work, as secured by	
	Sample data	Estimates	Census	Sample data	Census	Sample data	Census	Sample data	Estimates	Sample data	Estimates
State	$55.00	$54.00	$54.00	$58.00	$60.00	$36.00	$42.00	$4.75	$4.50	$3.00	$3.50
Section I	57.00	57.00	52.00	59.00	58.00	28.00	40.00	5.00	5.00	3.00	3.75
Section II	54.00	51.00	54.00	58.00	61.00	38.00	40.00	4.25	4.00	3.00	3.25
Section III	53.00	52.00	52.00	57.00	59.00	34.00	39.00	4.75	4.75	3.00	3.50
Section IV	55.00	55.00	56.00	61.00	63.00	46.00	43.00	5.00	4.75	3.50	4.00
Section V	55.00	58.00	52.00	56.00	58.00	38.00	39.00	4.25	4.50	3.00	3.75
Section VI	56.00	52.00	56.00	55.00	61.00	38.00	45.00	4.00	3.75	3.25	3.00
Section VII	56.00	52.00	62.00	54.00	64.00	42.00	57.00	4.00	3.50	3.00	3.00

Since the data in the foregoing tables are not in completely similar terms, it is impossible to make a thoro comparison of results. However, in Table VII, the more important wage contracts are compared, the figures being taken from Tables IV, V, and VI, and arranged in parallel columns.

The figures for the state as a whole on wages by the month for men hired for the entire year,[5] the only wage contract for which figures are available from all three sources, are very nearly identical. There is a rather close agreement in them for the various sections of the state as well, but also some very marked disagreements. For example, for Section I, the leading small grain area of the state, the census figure is $5 lower than in the other two. The best explanation of this seems to be that in parts of this area many children are employed for picking up potatoes, and the lower wages paid for this sort of work seem to have figured so largely in the average as to reduce it far below the normal level for ordinary farm labor for the section.[6]

Much of this sort of labor was reported on the schedules of the sample-data survey, but in compiling the data these returns were excluded in an effort to make the averages representative of the wages of mature farm laborers without managerial responsibility who are engaged in the usual farm work of the region. Hence figures representing the wages of children as well as of hired farm managers and specially skilled laborers were excluded.

There are discrepancies also in Sections II, V, VI, and VII. In three of these four cases, the estimated figure is lower than the others. This is a tendency manifested throughout all the tables and is difficult to account for except on the grounds that the estimators, giving figures based on their judgment rather than on actual experience, endeavor to be conservative in their estimates, particularly in a time when wages are rising. However, the most important divergence is the census figure for Section VII, which is $6 above the sample-data average and $12 above the estimated average. It is to be explained largely in the nature of the work for which wages by the month are paid. This section embraces most of the forested and cut-over region of the state. The typical farm business unit is small, profits are low, and the bulk of the labor, as indicated in Table II, is hired by the day at wages lower than those obtaining in other parts of the state. The few men working by the month and reported to the census takers are probably serving as farm

[5] The census figures given in this part of the table were derived by averaging the summer and winter wages as given in Table VI. As these summer wages as reported probably covered for the most part the eight months of the open season, they were given double weight in the averages.

[6] The census figures for summer wages in Clay County show nearly four times as many hirings in proportion to the number of farms as do those in the neighboring counties, and the average wage rate was only about half as high.

managers or in some capacity carrying more responsibility and higher wages than does ordinary farm work. Many of them are doing timber or road work. A monthly average including all the cases existing, like the census average, will give figures higher than in a region where most of the men are hired to do ordinary work. Here again in compiling the sample data, all returns were excluded which indicated that the men were functioning as something other than ordinary farm laborers.

In the second part of Table VI, the sample-data figures representing the average of wages paid men for the active farm season, that is, from about March 15 to November 15, are set in comparison with the census averages of "summer" wages, it being assumed that the farmers would report wages for the season in answer to this question in contrast to "winter" wages paid during the cold weather, largely for labor in the care of livestock. No estimate figures are available for 1919 on this type of contract. According to the sample-data returns, as indicated in Table II, this is the most common type of month contract in the state. The most noticeable difference shown in this comparison is the consistently higher level of the census averages. They are in general from $2 to $3 higher than the corresponding sample-data averages.[7] The reason for this seems to be that many farmers hiring help only for the latter part of the season hired by the month rather than by the day and at a much higher wage per month than they would have paid if hiring for the entire season. In many cases, also, men hired for the season were given a higher monthly wage as the season advanced. These high monthly wage figures for the latter part of the season were undoubtedly reported as "summer" wages in the state census, and being included in the averages, raised them somewhat above the normal level for full season pay. In compiling the sample data, the wages covering the first half of the season and those covering the last half were averaged by themselves, as reported in Tables II and IV. When these differences and their causes are taken into account, the figures on month wages on season contracts agree very closely.

The sample-data returns on winter wages were too meager to give representative averages. (See Table II.) There were nearly 12,000 census returns on winter wages, but many of these, as already explained, represented year contracts with uniform wages per month throughout the year. In some cases they represented winter wages of managers or farm foremen hired by the year. Not only is their general level too high, but it is especially high in certain sections. In Section VII, for example, it includes wages of men hired by settlers to help them get out their pulpwood and timber.

[7] The explanations already given of the low average in Section I and high census averages in Sections VI and VII, explain the two exceptions.

The state census blanks contained no questions on the rates of day wages. The sample data and estimate returns correspond very closely as to harvest wages even by sections. The estimated averages are, except in two sections, a little lower than the sample-data average. An explanation for this has already been suggested. The results of such comparisons as can be made on the basis of the figures available in this investigation indicate that estimates normally run lower than the actual figures in all instances in which identical cases are involved. Day wages for other than harvest work, on the other hand, show higher averages from the estimates than from the sample data. The reason for this is that the two averages are not strictly comparable. In the sample-data schedule, the farmer was asked to report the specific task for which the men were employed. In making up the tables from these returns, the wages paid for threshing, stacking, silo filling, and haying, if done at a time of the year when it would have to compete for labor with these other lines, were included with those for strictly harvest work as belonging to the same general class. Under the term "other labor" were grouped such tasks as early season haying and miscellaneous farm work. Very probably many of the correspondents of the Bureau of Crop Estimates interpret the term "harvest" narrowly and base their estimate of wages for "other labor" very largely on lines of work which carry wages almost if not quite as high as harvest work.[8]

The foregoing comparison of results throws some light, at least indirectly, on the relative merits of the three methods of collecting farm wage data. It would seem that the census method, while furnishing valuable checks on some of the results of the other methods, does not lend itself to detailed inquiries on complicated questions such as farm wages. If enough questions are included to bring out the details accurately, the method becomes too expensive. It is therefore best suited to collecting data on a few general, simple, and outstanding points.

Many of the details included in the sample-data schedules could be put into an estimates schedule. For many of them, however, estimates would not do, for example, the matter of specifying the dates between which each man was employed. And yet this was the basis of a large and important part of the analysis of the sample-data figures. Certainly no adequate equivalent of these facts could have been obtained through estimates of any sort. Further, it is reasonable to suppose that a more accurate average can be obtained by using actual data than by using estimates. The correspondent ordinarily bases his judgment as to "usual" or "average" conditions entirely on general impressions. He seldom has

[8] It is not to be concluded that the estimates on all sorts of data are likely to be uniformly lower than the actual figures. On the contrary, there is reason to believe that on such things as crop yields, acreage of the various crops planted, and number of livestock, the estimates are as likely to be too high as too low.

data enough even for a hasty analysis of wage distribution. If the estimates are numerous, and those that are too high are counterbalanced by others that are too low, the final result will be representative; but there is no guarantee that this will be true. In the case of actual data, the truth of the averages depends alone on the adequacy of the sample taken.

It is in this direction that the weakness of the sample-data method lies. If the facts are collected by enumerators who visit the farmers personally, the method is very expensive, especially if a good many details are included. As a result, the schedules are usually sent by mail. This introduces two difficulties: (1) many correspondents misinterpret the inquiries and give useless answers, and (2) many farmers do not wish to be troubled with the matter and refuse to fill and return the schedules. The first difficulty can be overcome by carefully framing the questions, and the second by sending out enough schedules. In the case of the sample data used in this discussion, approximately 7500 schedules were mailed, of which something less than 20 per cent were filled and returned. About 1500 of the returns were usable.

The question arises as to how the investigator using this method will know whether his sample is large enough to be representative. The best test of this is what is termed the frequency distribution of the data. While there is considerable variation in any data, such as the wages paid to all the hired men of a certain class in a specific year, most of those hired will receive nearly equal wages, and the wages most frequently paid will be near neither the lower nor the higher limit, but will tend to be near the middle of the range. From this largest group near the middle, the numbers hired at the various levels above and below decrease regularly so that at the very highest and the very lowest levels only a very few hirings occur. The larger the number of cases taken into account, the more nearly regular this distribution becomes, and the more regular the rise and decline. All that is necessary, however, is to have a large enough sample to show a reasonably regular frequency distribution. A sample that is too small to show this is an inadequate basis on which to judge the whole volume of data; therefore averages or other representative figures based on it are almost sure to be misleading. It must be admitted that in the case of certain wage contracts, such as those hiring for winter and for the first half of the season, the data obtained from the schedule in question are too few to make a good sample, particularly with reference to the individual sections. But in the case of the more important contracts the samples seem to be adequate.

WAGE RATES BY SECTIONS OF THE STATE

Wages of farm labor vary considerably in different sections of a given state, with different times in the year in the same locality, and with the different kinds of work for which the laborers are hired. They vary from region to region because of differences in the productivity of the land, in the efficiency of the farmers who are hiring labor, in the kind of work for which most of the men are hired, and in a great variety of economic and social conditions which affect locally the supply of labor and the demand for it. If labor moved freely from section to section in response to differences in wages, naturally wage levels would be the same everywhere. But farm labor is not very mobile. Supplied as it is largely from young men reared on the farm, it does not flow readily to other localities where wages are higher unless the difference in wages is fairly large. Consequently the farmers in the better farming districts may bid wages considerably above the level of the poorer districts without attracting much additional labor. Hence profitable farming in any section may mean higher wages in that section. Profitableness in farming depends primarily on the productiveness of land and the managerial ability of the farmers. Since in the long run the more able operators tend to get possession of the best natural resources, these two influences are usually found in combination. Differences in the kind of farm work affect wages because some kinds of farm work, such as dairying, require more skill and higher qualities than others, such as crop work; and other things being the same, wages may vary between localities according to the extent that one kind of work or another predominates. However, if local conditions make for an abundance of this superior skill and these higher qualities, the wages of the men possessing them may be lower than those of the laborers in another region whose work is not so exacting but who are not so numerous relatively to the demand for their services.

Our statistics indicate that there were regional variations in 1919 in the wages of Minnesota farm labor, tho the variations were not extreme. Figure 5 gives these variations by sections of the state for summer season help hired by the month, and for harvest hands hired by the day. The figures given are based on the sample data. Tables IV, V, and VI, or the consolidated figures of Table VII, show that these variations are fairly consistent for both month and day wages. Wages are highest in Sections I and IV, which together comprise the western part of the state. Probably the averages best reflecting the conditions of wages by the month are those of the sample data on wages of men hired for the season. These show month wages to be highest in Section IV, which, it will be recalled, has a type of agriculture based on corn, livestock, and small grain. Farms are large here, land values are the highest in the state, and farming is generally profitable. The next

highest average is found in Section I, the leading small grain area, where the natural conditions are not quite so favorable but where the size of the farm business is large and the type of farming such as to make a strong demand for labor in the open farming season. Next in order come Sections II and III which, tho small grain areas so far as cropping is concerned, are of great importance in dairying. As indicated by this set of averages, the regional variations in wages seem to bear a closer relation to the relative profitableness of farming and the size of the farm business unit than to any other factors.

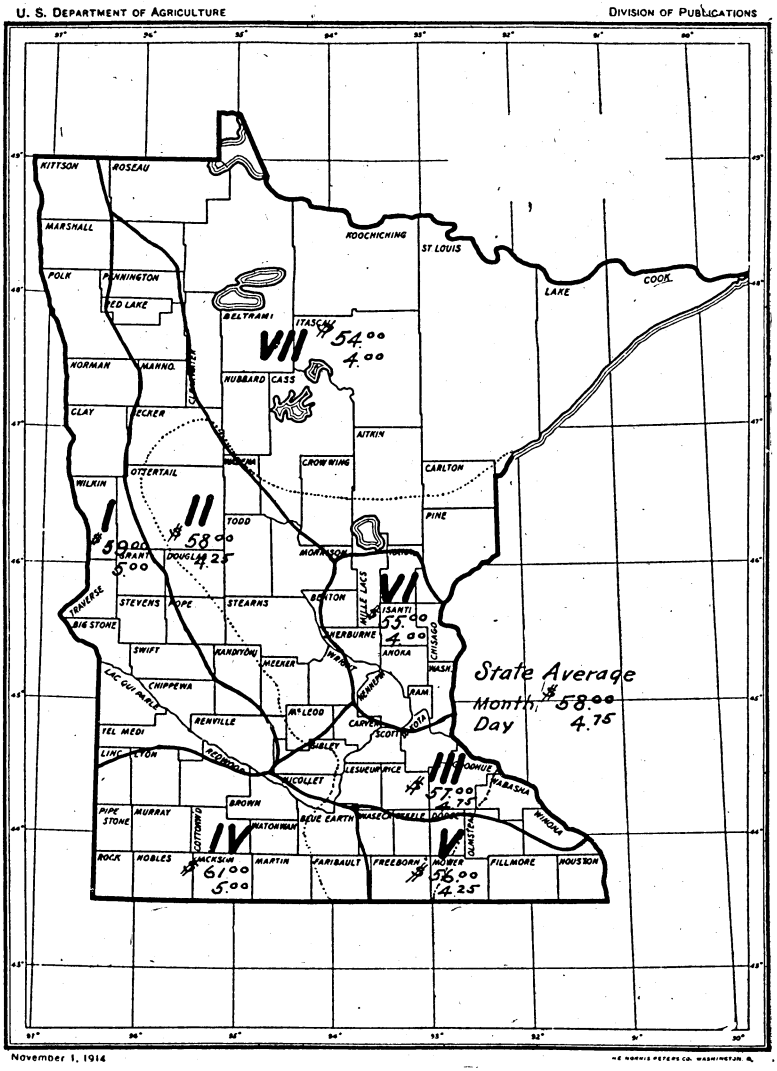

Fig. 5. Average Monthly Wage of Farm Labor in Minnesota, Hired for the Summer Season; Also of Harvest Labor Hired by the Day, 1919 (Sample data)

The best indexes of day wages are of course the averages for harvest labor, which in the case of the sample data cover wages paid for threshing, stacking, and other kinds of special work coming during the rush period of the crop season. Variations in these wages are evidently due to different degrees of intensity of demand for labor of this temporary sort. Such wages are highest in Sections I and IV, not only because of the importance of small grain which requires such a large amount of labor during the latter part of the season, but also because the farm business is so large that the excess of "peak load" labor over that of the earlier part of the season is so great that more help is needed of this sort than in the areas of smaller farms. The greater importance of corn in Section IV than in Section II and III evidently does not modify the seasonal distribution of labor sufficiently to counteract the effect of the large acreage of small grain per farm. In Sections VI and VII, where small grain is least important and where the farm business is small, the average for this class of wages is the lowest in the state.

Table VIII combines the returns obtained by the three methods. The figures given, in the writer's opinion, fairly represent the wage rates actually paid in 1919 in the several sections of the state for the more important classes of contracts. For the most part the figures are identical with those secured by one or the other of the methods which seem to give the most reasonable results. In a few cases, the figure has been approximated.

TABLE VIII

APPROXIMATE WAGES OF FARM LABORERS IN MINNESOTA, 1919

	State	Type-of-farming sections						
		I	II	III	IV	V	VI	VII
Year	$55.00	$57.00	$54.00	$53.00	$56.00	$55.00	$56.00	$56.00
Season	58.00	59.00	58.00	57.00	61.00	57.00	56.00	55.00
Winter	38.00	36.00	38.00	36.00	40.00	38.00	38.00	42.00
Harvest* ...	4.75	5.00	4.25	4.75	5.00	4.25	4.00	4.00
Other*	3.00	3.00	3.00	3.25	3.50	3.00	3.25	3.00

* Day wages.

WAGE RATES BY SEASONS

The most marked variations in wage rates are the seasonal ones. Variations of this sort result almost entirely from two causes: (1) farm work in all parts of the year or season is not equally important from the point of view of returns. If work which brings a low return is done at all, the farmer will pay lower wages to have it done than he will for work bringing high returns. (2) The amount of work, and hence the demand for labor, varies greatly in different parts of the year or season.

These seasonal variations are revealed in the monthly wage statistics in two ways. The monthly wage paid over a long period, which includes

the slack intervals, is lower than that paid for a short period covering the busiest part of the year. The average monthly rates for laborers hired by the year, given in Table IV, are lower for the state and for almost all sections than for laborers hired for the season. Again, laborers hired by the month for short periods receive greatly different wages, depending on the time of year. Winter wages are invariably low. Wages for the early part of the season, in Table IV, average only $53, while those for the second half average $71. So little farm work can be carried on in the winter that the demand is very light, and frequently the enterprises which require winter labor beyond what the farmer can do himself add less to the gross income of the farm than those requiring work at rush seasons. In the spring the nature of the work is such as to make a relatively light demand for man labor, while the tasks beginning with midsummer require a large amount of man labor, making the demand very heavy and the wages high.

Seasonal variations in the day wage rate are well brought out in Table IX. Here the portion of the working season from May 4 to October 26 is divided into one-week periods for the purpose of determining the relative amount of day labor at the different wage levels, and the average daily wage in the different parts of the season. The figures in the first column, headed "Wage classes," indicate the limits within which the wages fall which are listed respectively on each horizontal line. These limits are so selected that their means are the even-dollar quantities, two, three, four, etc. The figures in the body of the table represent the number of weeks of work reported for each specific week for each wage level. Since 76 per cent of the weeks of work represented in the table was paid for at some even-dollar rate, these classes represent substantially the even-dollar rates from $2 to $7, respectively. Each column in the body of the table is thus a frequency table for a specific week showing the number of man-weeks of work paid for in that particular week at each wage level so far as reported in the sample data. This enables us to determine at a glance what was the representative or most frequent wage paid during that week. The figures at the bottom show the total number of "weeks of work" reported for each week and also the average of all wages reported for each week. The last column shows the number of weeks of work paid for at various wages for the entire period.

The lower section of the table gives the average wages by weeks for six of the seven sections of the state. The rates at different periods clearly reflect the differences in systems of farming. The "peak load" is much more pronounced in Sections I and IV than in the other sections.

TABLE IX

RANGE OF WAGES PAID FARM LABORERS IN MINNESOTA WORKING BY THE DAY, BY WEEKS FROM MAY 4 TO OCTOBER 25, 1919

Wage classes	Number of weeks of work reported at the several wage levels for weeks beginning												
	May				June					July			
	4	11	18	25	1	8	15	22	29	6	13	20	27
$1.50–$2.49	12.0	12.0	14.0	14.0	11.0	11.0	10.5	11.0	19.0	7.0	7.5	6.5	5.5
2.50– 3.49	34.5	39.0	39.5	34.5	36.0	39.0	43.0	44.5	63.0	69.0	71.0	62.5	57.0
3.50– 4.49	15.0	14.0	6.5	12.0	17.0	18.0	18.0	18.0	33.0	55.5	66.5	70.0	73.0
4.50– 5.49	2.0	2.0	2.0	2.0	5.0	5.0	5.0	7.0	16.0	33.5	48.5	63.0	77.0
5.50– 6.49	...	...	...	...	...	...	...	...	3.0	6.0	10.5	12.0	17.5
6.50– 7.49	...	...	...	...	...	...	...	...	...	1.0	1.0	1.0	1.5
All classes	63.5	67.0	68.0	62.5	69.0	73.0	76.5	80.5	135.0	172.0	205.0	215.0	231.5
Average wage	$2.96	$2.94	$2.86	$2.89	$3.11	$3.10	$3.10	$3.11	$3.56	$4.14	$4.15	$4.19	$4.14

Sections	Average wages by type-of-farming sections												
Section I	$2.75	$2.86	$2.86	$2.94	$3.01	$3.16	$3.17	$3.41	$4.04	$4.18	$4.27	$4.42	$4.65
Section II	2.50	2.50	2.50	2.53	2.87	2.92	2.92	2.95	3.35	3.41	3.48	3.58	3.81
Section III	2.90	2.90	3.00	3.00	3.13	3.25	3.25	3.30	3.83	3.92	3.96	4.08	4.17
Section IV	3.05	3.05	3.45	3.50	3.50	3.54	3.40	3.41	3.73	3.92	4.03	4.35	4.59
Section V	3.00	3.00	3.25	3.25	3.26	3.15	3.14	3.14	3.36	3.47	3.62	3.60	3.67
Section VI	2.86	2.86	2.88	2.88	3.02	3.10	3.10	3.25	3.30	3.30	3.28	3.30	3.35

TABLE IX—*Continued*

RANGE OF WAGES PAID FARM LABORERS IN MINNESOTA WORKING BY THE DAY, BY WEEKS FROM MAY 4 TO OCTOBER 25, 1919

Wage classes	Number of weeks of work reported at the several wage levels for weeks beginning												
	August					September				October			All weeks
	3	10	17	24	31	7	14	21	28	5	12	19	
$1.50–$2.49	4.0	4.0	3.0	2.5	4.0	4.0	4.0	3.0	2.5	3.0	4.0	3.0	171.0
2.50– 3.49	52.5	51.0	46.0	45.0	33.0	33.0	39.0	38.5	31.0	28.5	27.0	25.0	1082.0
3.50– 4.49	66.0	65.0	68.5	62.0	36.5	33.0	21.5	19.5	15.0	18.5	21.0	16.5	867.5
4.50– 5.49	113.0	115.5	97.5	73.0	60.0	48.0	40.5	36.0	25.5	19.0	16.5	16.0	954.0
5.50– 6.49	26.0	23.5	22.0	20.0	16.5	13.5	10.5	6.0	3.0	2.0	1.0	1.0	288.0
6.50– 7.49	2.0	2.0	1.5	1.0	2.0	2.0	1.0	...	...	...	...	....	72.0
All classes	263.5	262.0	236.5	214.5	152.0	143.0	116.5	103.0	77.0	71.0	70.0	62.5	3434.5
Average wage	$4.34	$4.32	$4.30	$4.29	$4.28	$4.27	$4.05	$3.93	$3.86	$3.75	$3.70	$3.77	$4.09

Sections	Average wages by type-of-farming sections												
Section I	$4.84	$4.86	$4.86	$4.90	$4.86	$4.81	$4.67	$4.57	$4.30	$4.09	$4.05	$4.05	$4.43
Section II	3.92	3.90	3.90	3.92	3.89	3.83	3.83	3.67	3.54	3.43	3.40	3.40	3.49
Section III	4.54	4.32	4.23	4.19	4.18	4.06	3.78	3.64	3.69	3.81	3.83	3.83	3.97
Section IV	4.72	4.59	4.52	4.38	4.31	4.36	4.50	4.52	4.53	4.45	4.45	4.45	4.25
Section V	3.74	3.75	3.77	3.75	3.75	3.55	3.54	3.59	3.81	3.90	3.90	3.95	3.59
Section VI	3.51	3.55	3.57	3.57	3.20	3.19	3.23	3.18	3.23	3.29	3.29	3.34	3.22

Wages hold up much better late in the season in Sections IV, V, and VI than in the other sections. This is because of the corn crop in Sections IV and V, and because of the potato crop in Section VI. In Sections III, IV, V, and VI there is a somewhat slack period between the small-grain and the corn harvesting. In the southern sections, there is evidence of a little slackness about the middle of June, between the corn planting and the haying and harvesting. In all the sections, the abrupt rise in wages comes in the first and second weeks in July. The very highest wages are paid in the first part of August in the southern sections and a week or two later farther north. It must be stated that in some cases these averages may not be fairly representative. In some weeks in some sections, only a few hirings were reported. This is especially true in May and October.

A comparison of the total figures for weeks of work and the average daily wage, as given at the close of the first section of the table, shows a very close correlation between the amount of labor hired and the average of the wages paid. The amount of labor hired by the day increases with considerable regularity up to the week of August 3-10, and from that date on decreases with equal regularity. The average of the wages rises and falls with equal regularity and reaches its highest point at the same date with the maximum amount of hiring. This is even more true by sections than for the state as a whole. This would seem to show conclusively that the amount of labor demanded has a most important influence on the wage level.

It is of interest here to compare by weeks the most usual wage, as indicated in the body of the table, with the averages. For seventeen out of the twenty-five weeks covered by the table, the wage of most frequent occurrence was $3, but the average during these same weeks ranged from $2.86 to $4.15. The amount of difference between the average and the most frequently occurring wage depends, of course, on the number of hirings at wages either considerably above or considerably below the wage of greatest frequency. In the case of the data given in this table, probably the average is a better representative of the general wage conditions than the wage of most frequent occurrence, since it reflects with greater accuracy the effect of changes in demand for labor upon the wages that farmers must pay. However, the averages themselves without the detailed distribution as given in the table would present but an inadequate picture of the real situation regarding day wages.

WAGE RATES BY KINDS OF WORK

To test the relation of the kind of work done to the day wages paid, Table X was constructed. Not so many cases could be included in this tabulation because the particular work for which the men were hired was less frequently specified in the schedules than the dates of their employment.

TABLE X

RANGE OF WAGES PAID FARM LABORERS IN MINNESOTA WORKING BY DAY AT SEVERAL KINDS OF WORK, SEASON OF 1919

Wage classes	Number of weeks' work reported at the various wage levels for different kinds of work							
	Haying	Harvesting	Stacking	Threshing	Silo filling	Potato picking	Miscellaneous	All kinds
$1.50–$2.49	5	1	..	1	1	1	80	89
2.50– 3.49	53	22	3	14	6	9	191	298
3.50– 4.49	66	78	14	45	29	18	118	368
4.50– 5.49	46	151	20	129	33	8	71	458
5.50– 6.49	1	17	3	24	2	6	22	75
6.50– 7.49	..	1	..	5	1	1	3	11
All classes.....	171	270	40	218	72	43	485	1299
Average wages..	$3.76	$4.49	$4.43	$4.77	$4.36	$4.21	$3.41	$4.03

This study shows that the kind of work in itself has relatively little influence on the day wages paid. There are no significant differences in the wages paid for harvesting, stacking, threshing, and silo filling, all of which tasks come during the part of the season in which there is a maximum demand for labor. The most frequent wage for all of these groups is the same. The averages for haying and potato picking are appreciably lower than for the other kinds of work, but both of these two classes represent work done for the most part at times of the year when the demand for labor is not so heavy. There are, to be sure, certain kinds of work done in connection with farming which bring higher pay than ordinary tasks, regardless of the season. Operating traction engines and grain separators, carpentry and masonry and tile laying are examples. However, few cases of hiring for tasks of this class were reported in the schedules and these were excluded in compiling the data. It seems evident that, as compared with seasonal wage variations, differences in wages with different kinds of work are of very minor importance and that the demand for labor, as it rises and falls during the season, is the major influence behind wage differences.

TABLE XI

WAGES (WITH BOARD) OF FARM LABOR IN MINNESOTA AND BORDERING STATES, 1866–1920

Year	Month					Day—Harvest work					Other day work				
	Minnesota	Iowa	Wisconsin	North Dakota	South Dakota	Minnesota	Iowa	Wisconsin	North Dakota	South Dakota	Minnesota	Iowa	Wisconsin	North Dakota	South Dakota
1866	$14.85	$13.28	$13.99	$14.08		$1.60	$1.32	$1.51	$1.41		$0.95	$0.84	$0.90	$1.06	
1869	13.17	13.12	13.56	....		1.73	1.64	1.44	...		0.87	0.83	0.84	...	
1875	14.20	13.98	14.28	17.79		2.00	1.82	1.67	1.65		0.93	0.88	0.87	0.94	
1878	15.53	13.82	13.73	16.47		2.24	1.56	1.69	...		0.93	0.80	0.79	0.91	
1880	16.33	13.74	14.76	18.10		2.44	1.57	1.57	1.97		1.03	0.86	0.83	0.99	
1881	16.44	16.38	15.87	19.55		2.29	1.69	1.67	2.15		0.99	0.92	0.90	1.27	
1882	17.75	17.95	17.90	....		2.16	1.81	2.10	2.19		1.02	0.99	0.99	1.11	
1885	16.75	17.00	16.78	17.60		1.89	1.61	1.57	1.00		0.99	0.97	0.95	1.08	
1888	17.68	17.34	16.80	18.21		1.75	1.46	1.44	1.64		1.00	0.97	0.97	1.10	
1890	16.60	17.00	16.75	17.10		1.51	1.50	1.30	1.52		0.98	0.95	0.87	1.04	
1892	17.60	17.75	17.00	21.00	18.25	1.70	1.40	1.38	1.70	1.60	1.00	0.98	0.88	1.20	1.06
1893	18.78	19.46	18.58	22.27	20.24	1.56	1.33	1.27	1.73	1.57	1.02	1.00	0.96	1.13	1.11
1894	16.03	17.90	16.74	18.80	16.73	1.24	1.16	1.12	1.40	1.13	0.84	0.88	0.85	0.94	0.81
1895	17.32	18.15	16.92	19.47	16.89	1.46	1.19	1.11	1.60	1.37	1.00	0.93	0.84	1.03	0.96
1898	18.16	18.18	17.50	20.10	18.90	1.55	1.28	1.22	1.68	1.61	1.01	0.99	0.93	1.04	1.11
1899	19.98	19.32	19.20	21.82	20.41	1.84	1.47	1.40	1.99	1.87	1.18	1.11	1.06	1.18	1.26
1902	22.79	22.14	22.17	25.05	23.55	2.04	1.75	1.61	2.18	2.08	1.31	1.24	1.14	1.30	1.36
1906	25.81	24.69	25.83	28.90	27.82	2.22	1.93	1.78	2.48	2.32	1.46	1.38	1.35	1.51	1.60
1909	28.30	28.14	24.39	32.33	30.38	2.23	2.08	1.79	2.58	2.38	1.53	1.53	1.35	1.66	1.69
1910	26.00	28.00	26.00	29.00	27.00	2.23	2.12	1.76	2.40	2.35	1.48	1.57	1.35	1.60	1.54
1911	26.10	28.30	26.20	28.90	27.00	2.20	2.07	1.75	2.36	2.08	1.53	1.58	1.37	1.60	1.50
1912	27.90	29.60	27.40	30.30	28.60	2.37	2.16	1.85	2.70	2.40	1.59	1.66	1.46	1.91	1.65
1913	28.90	30.70	28.10	31.00	30.00	2.43	2.25	1.90	2.70	2.37	1.67	1.70	1.46	1.85	1.69
1914	28.70	30.10	28.00	31.20	30.10	2.36	2.24	1.87	2.68	2.40	1.66	1.67	1.45	1.75	1.71
1915	28.80	31.10	28.50	32.00	31.20	2.33	2.20	1.83	2.82	2.47	1.65	1.68	1.45	1.80	1.71
1916	33.00	34.10	31.00	33.20	33.70	2.55	2.35	2.02	2.90	2.69	1.85	1.85	1.66	1.94	1.90
1917	39.00	41.00	36.00	41.00	42.00	2.96	2.83	2.40	3.40	3.30	2.17	2.23	2.00	2.45	2.52
1918	47.10	50.00	43.50	52.00	55.70	3.90	3.65	3.00	4.50	4.40	3.00	2.90	2.48	3.20	3.50
1919	53.70	55.00	48.70	56.00	65.00	4.30	4.46	3.30	4.85	4.95	3.32	3.46	2.90	3.50	3.90
1920	67.00	66.35	62.00	70.00	76.00	5.10	5.00	4.15	6.10	5.50	4.15	4.08	3.50	4.40	4.65

WAGES AS RELATED TO OTHER FARM EXPENSES

It is worth while now to consider farm wages in relation to the other expenses of production, such as rent and cost of equipment. Have wages risen more or less rapidly than these other expenses? What has been the effect of these changes on the amount of labor used? This part of the bulletin tries to answer some of these questions.

THE COURSE OF FARM WAGES

The United States Department of Agriculture since 1866 has secured estimates on the wages of farm labor from its correspondents and published the results in the form of state averages. Prior to 1909 these figures were collected at rather irregular intervals, but since then they have been collected annually. Table XI gives the Minnesota averages for this whole series of wage surveys together with those for Wisconsin, Iowa, South Dakota, and North Dakota.

If the figures of this table fairly approximate wages on farms of this region throughout the period, month wages almost doubled between 1866 and 1909, and more than doubled again between 1909 and 1920. Day wages in harvest have not increased so rapidly. Up to 1913, in Minnesota, they had never been 50 per cent above the 1866 level, and in 1920 they were only a little more than three times as high. Practically throughout the entire period, farm wages both by month and by day were higher in Minnesota than in Wisconsin and Iowa, and lower than in the Dakotas. This seems to indicate that wages are normally higher in the newer portions of the country, especially prairie regions, than in the older and better developed portions.

The more rapid increase in month wages as compared with day wages indicates that the demand for labor throughout the season has increased more rapidly than for labor needed only a short time for special work. Such a relative increase in the all-season demand for labor may be expected to accompany the growth and development of farming in any new country.

CHANGES IN PRICES OF THE OTHER FACTORS OF PRODUCTION

Great as has been the increase in the wages of farm labor, the prices of most of the other factors of agricultural production have, throughout the period, except in the last few years, risen even more rapidly. Table XII shows both the actual and the relative change in the average value of land per acre including improvements, the average price of work horses, the aggregate price of a representative group of farm imple-

ments,[9] and the average monthly wages of farm labor; for each of the census years from 1880 to 1920.[10] The prices of these things are taken for comparison because they represent the Minnesota farmer's most important expense items, his outlay for land, labor, equipment, and power.

TABLE XII

CHANGES IN VALUES OF FARM PROPERTY AND IN WAGES OF FARM LABOR IN MINNESOTA, 1880–1920

Date	Values				Percentage of change from 1880			
	Land, per acre	Horses, per head	Machinery, per representative group	Wages, per month	Land, per acre	Horses, per head	Machinery, per representative group	Wages, per month
1880	$14.45	$64.58	$560.00	$16.33	100	100	100	100
1890	18.22	77.92	447.00	16.60	126	121	80	102
1900	25.51	67.90	378.00	19.98*	177	105	68	123*
1910	46.62	132.16	565.00	28.30†	323	205	101	173†
1920	109.25	96.48	1056.00	53.70‡	756	149	189	328‡

* For 1899. † For 1909. ‡ For 1919.

In the second half of Table XII the prices existing in 1880 have been taken arbitrarily as 100 per cent. The difference between 100 and the percentage figure appearing for any other year will therefore represent the percentage of change in price since 1880. The comparison thus obtained shows that with the exception of farm machinery the increase in the price of labor prior to the late war was less than for any other item. While wages increased only 73 per cent by 1910, the price of horses increased 105 per cent, and the price of land 223 per cent.

In most cases these price changes have been very closely related to changes in the general price level for the whole country. In Figure 6 this general price level is represented by United States Bureau of Labor Statistics price indexes, which are based on averages of the wholesale price for the United States of a large number of commodities, and are expressed as relatives based on the figures for 1914. On the same chart

[9] This group consists of one each of the following: farm wagon, corn plow, gang plow, grain drill, harrow, twine binder, and mower. Figures were secured from wholesale dealers supplying Minnesota local dealers. For the purpose of comparing changes in prices of machinery with changes in the price of land, horses, and labor, what is needed is a representative rather than a complete list of equipment. Wholesale prices probably indicate changes in retail prices with sufficient accuracy.

[10] The period 1880-1910 was selected as being best for comparative study. The figures for 1920 have become available since the study was made and have been added to the table. The year 1880 is taken for the beginning because conditions were then relatively stable, and it also marks the point at which farming had become fairly established over most of the productive portion of the state.

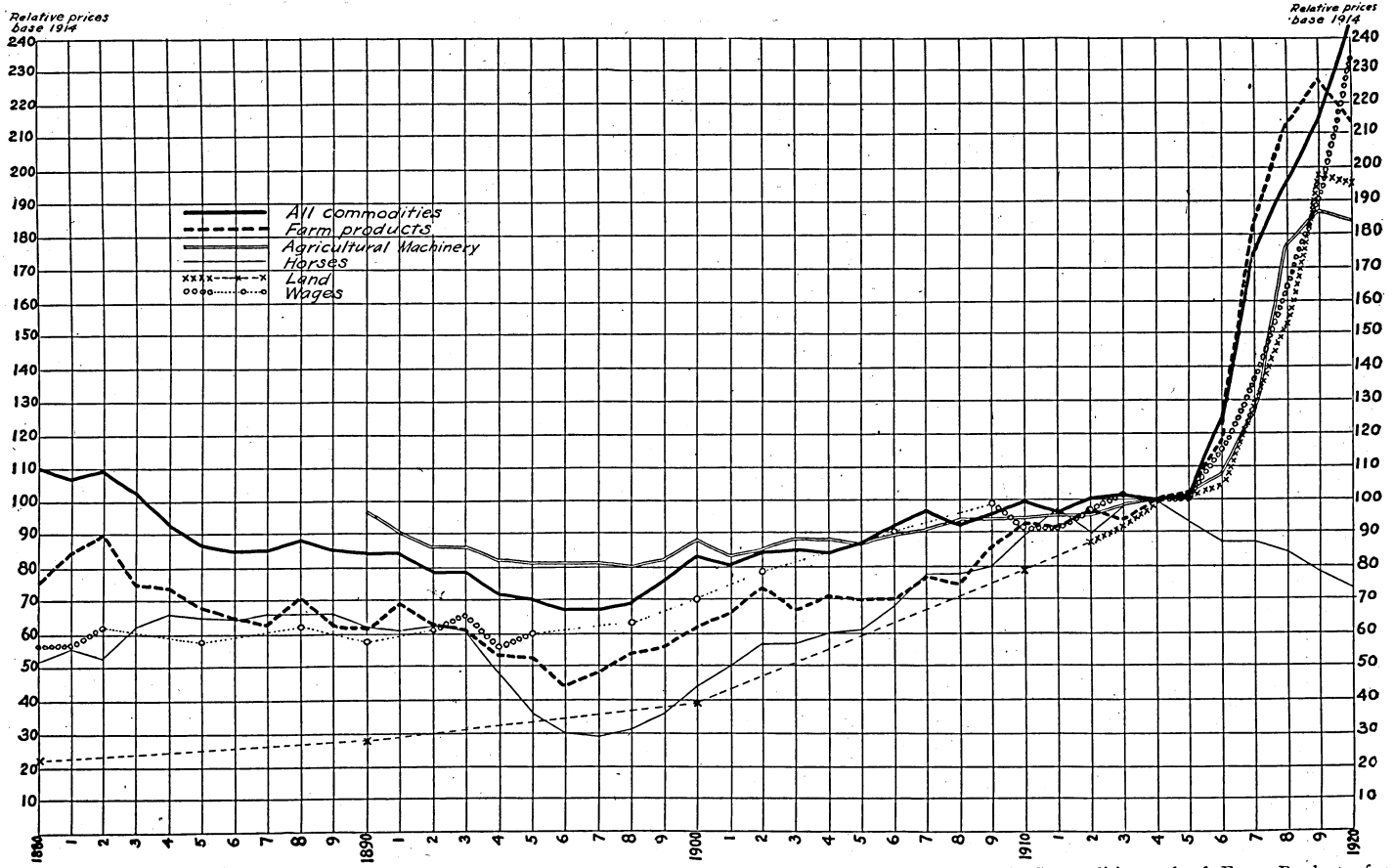

Fig. 6. Relative Prices of Selected Factors of Agricultural Production in Minnesota Compared with Those of All Commodities and of Farm Products for the United States, 1880-1920

The base year for all prices is taken as 1914. In interpreting any chart of "relative" prices, that is, prices given in terms of percentages of the actual price of a given year or period, it is important to understand that divergence of the curves means simply differences in the rate of change.

is placed a curve for farm products for the country as a whole, and other curves for the Minnesota prices of those factors of farm production already discussed, in so far as comparable figures could be obtained.

It will be noted from this chart that the trend of the general price level was gradually downward from 1880 to about 1896. This is a part of the long period of price decline dating from near the close of the Civil War. From 1897 to 1915 the trend was gradually upward, followed by the extremely rapid price increases of the World War period. The curve representing the general average prices of agricultural products stays very much below the curve of all commodities in the early part of the period, approaches it more closely after the low-price point of the middle nineties, and actually stands above it for nearly every year from 1914 to 1919. This means simply that the prices of agricultural products have been rising somewhat more rapidly during the last twenty-five years than the prices of other commodities. This indicates that prior to that period, relatively more people were producing agricultural commodities than since then, with the result that productive effort in agriculture was relatively less remunerative then than it has been since. The gain of agricultural prices over other prices reflects the effect of a readjustment made by the effort of people to get into the line of production that pays best. In other words, the number of farmers and farm laborers has been increasing relatively less rapidly during the last twenty-five years than the number of people in other pursuits. Agricultural products, as a result, have become relatively scarcer and their prices relatively higher.

It will be noted that at the beginning of the period farm wages were well below both the general price level and also the price level of agricultural products, but that from 1885 to 1915 their trend was very close to that of the price of agricultural products.[11] During the war period, however, and afterward, the prices of agricultural products rose more rapidly than farm wages, until the break came in 1920, after which prices of agricultural products declined more sharply than wages. The significance of these changes in trend is discussed later in the bulletin.

The low level of farm wages shown for the early part of the period would have been even more marked if the curve had been extended back to 1866. The low wages of farm labor between the close of the Civil War and 1890 is due to a number of causes. During the war, northern farmers had been able to maintain and even increase the volume of their production, in the face of a severe labor shortage, by increasing the use

[11] The higher level of wages shown in the chart from 1892 to 1909 is due to the fact that between those dates the actual wage figures from which the relative figures used in the chart are derived, are averages for the growing season and not for the whole year, as is true of the figures for the other years. They are, therefore, somewhat higher. It is impossible to get whole-year monthly average figures for this period.

of machinery. With demobilization, the labor market was flooded and the industrial development of the country was not then great enough to absorb the ex-soldiers readily. Many thousands of them took homesteads, but this did not wholly relieve the over-supply, because for lack of funds and other reasons, these claim-holders were not able at once to develop their land into productive farms capable of furnishing full-time employment for the settlers and their families. Further, there was, during this period, a heavy immigration of North Europeans who came to this region to establish farms. Later, when the farms were improved and production on them rose to normal, the wage level began to follow very closely the price level. The farmer can not long pay high wages in the face of falling prices, nor can he long continue to get help at low wages when prices have risen; for high prices prompt increased production both in agriculture and in other lines and consequently increase the demand for labor with a resulting rise in wages. The failure of farm wages to fall immediately with the fall in the price of farm products in 1920 will be explained later.

The curve representing horse prices in the chart is based on United States Department of Agriculture estimates of the average value of all horses on the farms of Minnesota. It shows two outstanding variations from the trend of the other price curves of the chart. The first is the extreme decline during the low-price period of the nineties, and the other is the decline during the late war at a time when all other prices were rising rapidly. Horses on Minnesota farms are both a product and a means of production. They are produced mainly for use on the farm, but there is normally in the state a small surplus for sale and the value of all horses tends to be expressed in the prices which can be secured for this small surplus. Further, because horses mature slowly and wear out slowly, the supply does not respond quickly to changes in price. Hence they are subject to rather extreme price fluctuations, but these fluctuations necessarily come at wide intervals.

It was impossible to get annual figures representing the value of farm machinery before 1890. However, the figures shown are sufficient to give us a general idea of the trend of their prices. During the period from 1890 to 1910 the prices of machinery, tho not sagging greatly in the years of lowest prices, in general were declining relatively to the general price level and to the prices of farm products. This is part of a movement dating back to the introduction of the more modern farm machines and is to be accounted for mainly by the growth in efficiency in manufacture and consequent reduction in the cost of producing the machines. The information we have on machinery prices indicates that they behave quite similarly to the prices of any class of goods which can be freely manufactured in amounts to meet the changing volume of demand. The price of such goods tends in the long run to be governed

by the costs of manufacture, and as these costs necessarily rise and fall with changes in the general price level, the close correspondence between the prices of machinery and those of general commodities, as shown by the chart, is to be expected.

The price of no other factor of agricultural production has increased so rapidly as that of land. Table XII shows that in 1880 farm land in Minnesota averaged $14.45 per acre. There was, apparently, no decrease in the nineties as in the case of labor, horses, and machinery, but the increase after 1900 was much more rapid than previously, and in 1910 the average price per acre was more than three times as high as it was in 1880. Land values during the war period did not rise quite as soon as wages and other prices, but by 1919 they had almost doubled the 1909 rate, and in 1920 they were two and one-third times the 1909 rate. The 1920 census shows the average for the state to be $109.25 per acre.

The reason that land prices rise rapidly is that the supply of land can not readily be increased in response to expanding need for its use in the production of agricultural commodities. Like other means of production, it tends to have its value determined by the value of its products; but unlike livestock and machinery, which can be produced in quantities to keep pace with either an increasing or decreasing demand, and labor which can be moved from one situation to another in response to changing need, land is fixed both in amount and location. Hence, when an expanding wheat market calls for more wheat, the supply of all the things needed to produce it may be pretty readily increased except land. Hence there results a scarcity of wheat land. This scarcity of wheat land causes a scarcity of wheat, which causes the price of wheat to rise. This in turn causes the price of wheat land to rise because people are now willing to pay more than before, either in annual rent or in actual purchase, for the opportunity to raise wheat. If land could be manufactured like grain binders, this scarcity would not appear and the price would not rise appreciably above the cost of producing land. In 1880 there was considerable wheat land still unused, which was capable of as high yields as much of the land then in use. The price of land in Minnesota at that time represented largely improvements and advantage of location. However, as the industrial population increased both in this country and abroad, and more wheat and other products were needed, practically all the usable lands were occupied. Thereafter, as demand for these products still further increased, the series of causes just described was set in motion, with the result that prices of land have risen much more rapidly than those of labor and the other means of production the supply of which could be increased at will.

CHANGES IN AMOUNTS OF OTHER FACTORS USED WITH A GIVEN AMOUNT OF LABOR

We are now ready to note how these varying rates of increase in the prices of the factors of agricultural production are related to the proportions in which they are actually used. When the price of any one factor rises more rapidly than that of the others, does it follow that the farmers must be using less of this more expensive factor and more of the cheaper ones? It has been generally assumed that they are using less of the expensive factors. The census gives us at ten-year intervals information which, combined with other data, enables us to measure with some degree of accuracy proportional relationship between labor, land, machinery, and horses. Table XIII (see also Fig. 7) is designed to show this relationship. Because in this discussion we are interested primarily in labor and wages, the table has been constructed to show for the different years: (1) how many units of the other things have been used for each man in the state engaged in farming—including, as before, both farmers, their mature sons, and their hired men; and (2) the percentage of change in these proportions from those of the base year, 1880.

TABLE XIII

AMOUNT OF LAND, MACHINERY,* AND HORSES USED PER MAN ENGAGED IN AGRICULTURE IN MINNESOTA, 1880–1910

Date	Actual No. of units				Percentage of change			
	Land (acres)		Machinery (value)	Horses (No.)	Land (acres)		Machinery (value)	Horses (No.)
	Total	Improved			Total	Improved		
1880	109.2	59.1	$106.69	1.7	100.0	100.0	$100.0	100.0
1890	110.7	66.0	100.68	2.3	101.3	111.7	118.2	130.5
1900	111.9	78.6	128.27	2.3	102.5	133.0	177.8	134.5
1910	108.5	77.0	205.19	2.4	99.1	130.3	190.4	137.9

* The figures in the first machinery column were found simply by dividing the total farm investment in implements and machinery as reported by the census, by the number representing the men engaged in agriculture. The figures do not show the actual increase in the use of machinery because the money investment depends not only on the amount of machinery used but on its price. It was necessary, therefore, to derive the percentage of change for machinery by a different method from that used for the items in which we have non-money units. This was done by first getting percentage-of-change figures on machinery investment and dividing these for each year by the percentage-of-change figures on machinery prices as given in Table XII. This gives the percentage-of-change figures used in this table. They are only an approximation to the actual rate of increase in the use of farm machinery in Minnesota agriculture, but it is believed to be a fairly close one.

The table shows several interesting things: (1) That altho the price of land almost trebled between 1880 and 1910 and wages increased only 75 per cent, the rates of labor to land remained about constant. Part of the increase in the value of land is of course, accounted for by the increase in the amount of improved land, which really represents an increase in capital in the form of clearing, draining, fencing, etc.

(2) Altho the price of machinery remained about constant during the period, the amount used per laborer and per acre nearly doubled. (3) While the price of horses was doubling, the number used increased only one third in relation to labor, and decreased one third in relation to machinery.

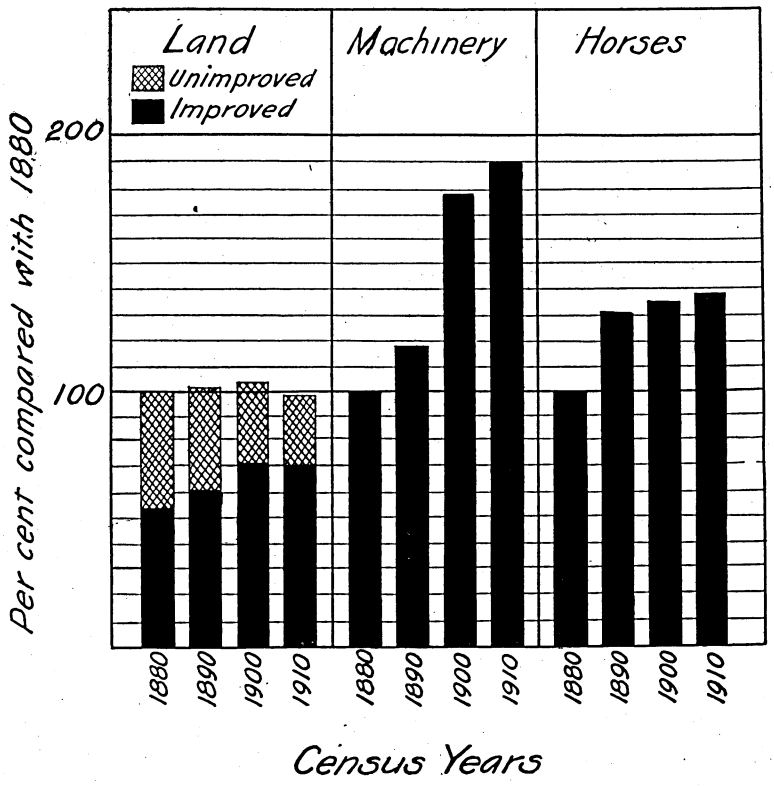

Fig. 7. Changes in Average Amounts of Land, Machinery, and Horses Used with Each Man Engaged in Agriculture in Minnesota, 1880-1910

Note that the amount of machinery almost doubled and horses increased nearly 40 per cent between 1880 and 1910, while the amount of land has remained almost constant. This means greater intensity of cultivation in terms of power and machinery tho not of labor.

As classified by the census, improved land in Minnesota means in general cropped land, while unimproved land is mostly permanent pasture. Some of the latter is rough, uncleared, or undrained, tho much of it is highly productive as a means of supporting livestock enterprises; but under normal Minnesota conditions, pasture is a much less intensive use of land than cropping. Hence the increase in improved land really represents a greater utilization of land in terms principally of capital.

How the farmer has been able to increase the utilization of his land—that is, farm more intensively—without significantly increasing his labor,

is largely explained by the figures on machinery and horses. The great increase in machinery means not only that the implements used were better and of higher capacity and thus able to do more and better work, but also that more and more farm operations formerly done by hand or by the use of primitive implements were being done by improved, high-capacity machines. This development in farm machinery enabled farmers both to devote more of their land to the more intensive uses and to do much better and more intensive work on their constantly increasing area of cropped land. Along with this, undoubtedly, went a much higher utilization of the farmer's time. He was employed more constantly and his work was much more effective as measured in volume of product. Work animals likewise were used more effectively by increasing the number of days of employment per season. This is evident from the fact that their increase in number was at a much slower rate than that of machinery, notwithstanding the fact that in the early part of the period oxen were of much more importance than in the latter part. The growing importance of livestock enterprises, particularly dairying, which requires considerable labor, could not have accompanied this growing intensity in the use of land without a corresponding increase in the labor supply except for this phenomenal growth in the use of machinery.

We must conclude, therefore, that the Minnesota farmer has found it wise to increase the utilization of his land by using more machinery per acre rather than more labor: (1) because it is cheaper; (2) because it requires less management; and (3) because it is more effective than additional labor in the operations involved in Minnesota farming. It was unnecessary for him to increase his use of horses as rapidly as machinery because new types of machines, new methods of operation, and changes in the type of farming enabled him to utilize his work animals more completely by working them more days of the year.

Some other facts not brought out in Table XIII bear directly on the matter of changing proportions. (1) In spite of the increase in the value of land, each farmer in 1910 was handling 177 acres of land, of which 71 per cent was improved, compared with 145 acres in 1880, of which 54 per cent was improved. (2) In spite of a 75 per cent increase in wages, each farmer was managing, in addition to his own labor, two thirds of a hired man in 1910 as compared with one third of a hired man in 1880. (See Table I.)

Thus in terms of management, each farm operator in 1910 was managing 22 per cent more land than in 1880, and 25 per cent more labor, counting his own. The increase in improved land during this period from 78 to 126 acres per farm represents an increase of 56 per cent in amount of capital managed in the form of land improvements. Further, each farm operator managed 138 per cent more machinery and 74 per

cent more horses. No figures are available to show the relation of managerial incomes to this very great increase in the ratio of land, labor, and capital to management; but it is obvious they bear no regular proportion to each other. The farmer's primary concern is to get the highest total net gain for himself rather than the highest rate of gain on the cost of land or any other factor or even on his total investment. His profits may be considerably larger with a low rate of return on a large investment than with a high rate on a small investment. It is reasonable to assume that as he expands the area of land he uses, thereby increasing his investment in land, in terms either of annual rent or purchase price, the returns on the successive additions to such investments will decrease because the land itself will be less thoroly used as he uses more and more of it. But he will find that his whole net gain is increased by these additions as long as there is any appreciable margin between what the additions cost him and the increase they bring to his total receipts.

As for labor, it is obvious that a farmer should hire no labor on which he can not make at least a little profit. That is, unless the hiring of a man for the whole or a part of the season will result in adding something to his total net gain for the year, there is no object in hiring. This gain may come through saving a part of the crop at harvest which would otherwise have been lost, or it may come through expanding the business by hiring an additional man and renting or buying additional land and equipment. It is undoubtedly true in hiring men in order to expand the business, that, beyond a certain limited number, the additional investment in wages, rent, interest on additional land, and the other expenses going with expansion, bring a lower and lower margin of gain the further the expansion is carried. This is due primarily to the fact that the more men a farmer has, the less carefully he can direct the work of each of them and the greater the loss of time, equipment, and supplies, because the oversight is less thoro. Herein is found the real limit to the number of men a farmer should hire. Hence in most types of farming and under most conditions in all types, the farmer finds that he reaches the limit of profitable hiring very quickly. Indeed, on a great many farms the farmer, taking into consideration the uncertainty of yields and prices, finds it safer to expand his business only to the limit set by the labor of himself and the members of his family, perhaps hiring a little additional labor during the rush periods of the season. Other farmers, usually those having little or no family labor, find it profitable to hire one or two men steadily, while an occasional farmer, who possesses unusual managerial ability, may successfully engage from six to twelve or more men with a correspondingly large amount of equipment, land, and productive livestock.

There are, of course, many conditions which cause changes in the limits of profitable hiring. When the prices of products rise faster than

wages, as they frequently do in periods of business expansion, it will pay the farmer to hire more men, provided he can obtain the additional land and equipment necessary to employ them. On the other hand, a marked fall in the prices usually leaves wages temporarily at a higher level. In such a case, farmers, like all business men, find it necessary to contract their business and hire fewer men. A change in the organization of the farm from a type requiring little labor in proportion to land to one requiring much, or vice versa, necessitates a corresponding change in the amount of hired labor. The shift from grain farming to dairying in parts of this state is resulting apparently in a larger proportional number of year-round hired men. It is to be expected, also, that as experience and education come to play a large part, the managing capacity of farmers will grow. This may be expected to create greater competition for men, with the result that the more skilful managers get the men, while the less skilful tend to drop out of the business.

RELATION OF FARM WAGES TO GENERAL BUSINESS CONDITIONS

We have already noted the extraordinary changes in wages and prices during the last six years. It is worth while to analyze these in their relations to each other. It is generally assumed that these changes were occasioned by the World War and that with a return to "normal" such changes are not to be expected. It seems evident that this series of changes received its impetus from the war and that the changes would not have reached such magnitude but for the profound influence of the war. However, the normal in business is a succession of changes now generally known as the business cycle. Conditions during the last six years have forced public attention to this phenomenon so that the several phases of the cycle and the characteristics of each phase are pretty generally known. The extraordinary extremes of business activity so far as they can be revealed by price changes are well brought out by the index figures of the Bureau of Labor Statistics already presented in this bulletin. How this unusual upheaval has affected the farmer's business, particularly with reference to his ability to hire labor, is discussed in the remaining portion of this bulletin.

NATURE AND CAUSES OF THE FARM LABOR SHORTAGE

One aspect of the business cycle just described is the recent unusual shortage of labor. This shortage began to appear in 1917 and became acute in 1918 as a result of the formation of the national army. It was relieved somewhat in 1919 by the demobilization of the army, but became acute again late in 1919 and the early part of 1920, owing to the

remarkable expansion in industry and trade which reached its climax in that period. This expansion was terminated by the crisis of the summer of 1920, and with the sudden curtailment of industry, the labor shortage was ended and unemployment began to appear in certain industries.

The supply of farm labor was affected much the same as labor in general. The figures in Table XIV, taken from the April numbers of the Monthly Crop Reporter for 1920 and 1921, reflect the view of the situation held by the farming class. They are based on the estimates of farmer correspondents of the Bureau of Crop Estimates in reply to inquiries sent out about March 1, before the opening of the crop season. They indicate that in the collective judgment of the Minnesota correspondents as expressed at the beginning of the 1920 season, there would be 108 farm jobs open in the state for every 100 open in the years, say from 1909 to 1914. At the same time, for every 100 men seeking farm jobs in these earlier years, there would be only 76 in 1920. Taken together, these two conditions would mean that for every 100 farm jobs open in Minnesota in 1920 there would be only 71 men to fill them. However, these correspondents estimated that in the season of 1921 there would be only 92 per cent as many farm jobs open as in the years before the war and 97 per cent as many men seeking farm work. This would mean that for every 100 jobs there would be 105 job seekers.

TABLE XIV

ESTIMATED SUPPLY AND DEMAND OF FARM LABORERS, 1918–1921

	Supply of farm labor (per cent of normal)				Demand for farm labor (per cent of normal)				Ratio of supply to demand (per cent)			
	1921	1920	1919	1918	1921	1920	1919	1918	1921	1920	1919	1918
United States ..	95.2	72.4	84.4	72.8	87.5	105.3	101.8	101.4	108.8	68.8	82.9	71.9
Minnesota .	97.0	77.0	86.0	78.0	92.0	108.0	103.0	100.0	105.0	71.0	83.0	78.0

Probably these figures reflect approximately conditions of supply and of demand for farm labor so far as they can be forecasted at the beginning of the season, but they need careful interpretation in order not to be misleading. In the first place, it is impossible to foresee the conditions which may develop during the season both in agriculture and in general industry. As a matter of fact, in the season of 1920 the growth of unemployment in industry released large numbers of men for farm work, particularly for the harvest season, and the supply of labor was adequate.

In the second place, such figures are likely to be misleading when taken alone because they give no idea of how much a given shortage in hired laborers affects the total supply of farm labor. Specifically,

what effect would it have had on the farmer's business and on the agricultural output of Minnesota if twenty-nine out of every hundred possible farm jobs in the state had remained unfilled in 1920? This depends first on how important a place the hired man holds in Minnesota agriculture, and second, on the extent to which his place may be taken by a larger use of machinery. No figures on the first point are available more recent than those of the 1910 census. At that date, of the 256,544 persons reported as engaged in agriculture in the state, 145,589 were farmers, 61,026 were given as laborers working on the home farm, that is, they were in the family labor class, and 49,928, or 19.4 per cent, were hired help. (See Table I.) There was, therefore, about one hired man for each three farms. A reduction of 29 per cent in this 19.4 per cent of the farm labor supply would really be a reduction of only 5.6 per cent of the total number permanently engaged in agriculture. Probably there was some reduction also in the family labor through farmers' sons leaving the farm in larger numbers than usual, but it is doubtful if both these sources of shortage together amounted to 10 per cent of the whole number of those normally engaged in farming. Even if the shortage had amounted to 10 per cent, it would not have been so serious in view of the possibility of offsetting a lesser use of farm labor with a greater use of farm machinery.

The third and most essential reason why such figures as those of Table XIV can not accurately forecast the labor situation for the season is that they can not, in advance of the hiring season, be based on any actually existing wage level. Demand and supply are always with respect to given prices, and at the time these estimates were reported, no labor prices had been established.

If farmers bid strongly enough for laborers to draw them from other lines of employment, the labor "shortage" in farming disappears. A shortage in an industry such as agriculture really means, therefore, that employers in that industry are unwilling or unable to pay enough wages to get the help needed to develop their business as fully as they would like. It will usually be the less efficient employers who have to go without labor. That such a condition as this existed to a degree in agriculture for several years prior to 1921 is indicated in Table XIV. The 1921 figures in this table show how these conditions have changed since the crisis. The effects of the change on wages will be apparent in the farm wage figures recently reported for the season of 1921.

Two conditions doubtless contributed to the so-called shortage of farm labor. The first of these was the unusual profits in certain manufacturing businesses during the war and just afterward, which have made possible the payment of unusually high wages, thus creating unusual competition for the farmer's labor supply. The second of these was the general scarcity of labor. The hasty mobilization of an army

of more than four million men produced a temporary acute shortage. Casualties and disease permanently removed about 100,000 of these men from the labor supply. This, however, is almost a negligible fraction of our total labor supply. The unsettled condition of the demobilized men, and to some extent of all the laboring population, which came as a result of the war, was probably a more important reason for the shortage. But the most important of all the war's effects on the supply of labor, was its effect on the rate of immigration. Table XV shows the net permanent immigration for the thirteen years ending in 1920. These figures are exclusive of the entrance and departure of transient travelers.

In the ten years between 1900 and 1910 the average annual increase in the number of people gainfully employed in this country was, according to the federal census, 909,103. In 1910, those gainfully employed were 42 per cent of the total population. For the five fiscal years prior to the European war, net immigration averaged 746,369. Assuming that half the immigrants are potential wage earners, this would mean 373,185 wage earners per year. This number is 41 per cent of the average annual increase in the income-earning portion of our population.

TABLE XV

PERMANENT IMMIGRATION TO AND EMIGRATION FROM THE UNITED STATES, 1908–1920*

Year	Immigration	Emigration	Net Immigration
1908	782,870	395,073	387,797
1909	751,786	225,802	525,984
1910	1,041,570	202,436	839,134
1911	878 587	295,666	582,921
1912	838,112	333,262	504,910
1913	1,197,892	308,190	889,702
1914	1,218,480	303,338	915,142
1915	326,700	204,074	122,626
1916	298,826	129,765	169,061
1917	295,403	66,277	229,126
1918	110,618	94,585	16,033
1919	141,132	123,522	17,510
1920	430,001	288,315	141,686

* Annual Reports of the Department of Labor.

In the fiscal year 1915, the first year of the war, net immigration fell to 122,626, thus supplying less than 7 per cent of this normal yearly increase. In the fiscal year 1918, the first year of our participation in the war, net immigration fell to 16,033, furnishing on the basis of our assumption, only 8000 workers, or less than one per cent of the normal annual increase in bread winners. The figures for 1920 indicate that immigration is again settling back to pre-war volume.

There are no adequate grounds on which to base an estimate of the effect of these several sources of loss on labor supply. The nearest approximation which can be made is that between 1914 and 1919 the average additions to the wage-earning population were reduced to probably 60 per cent of normal, while the subtractions, due to death, disease, and other causes, have been slightly above normal. Doubtless as many men were working in 1919 as in 1914; but during this time our industries were expanding rapidly.

The farm labor shortage of 1918 and 1919, however, was due as much to the shifting of men from agriculture to other industries as to the general labor shortage. The other industries were short of labor because of their great expansion. Some of this expansion preceded, but more of it followed our entrance into the war. Ship-building, camp construction, and numerous other lines of activity carried on under government contract, also added greatly to the non-agricultural demand for workers. The relaxation following the armistice set off a period of extravagant spending, which gave a still further boom to manufacturing. We have no statistical measure of the extent to which this heavy demand for manufactured goods during the war and afterward actually drew laborers from agriculture. As the rural birth rate is normally higher than the urban, and as improved methods in agriculture, coupled with the more rapid development of trade and industry, are constantly reducing the ratio of those engaged in agriculture to those otherwise employed, there is normally a constant flow of workers from agriculture to urban pursuits. But there is little doubt that this flow was of greater volume during this period of industrial expansion; and that the back-flow, which is never large, was smaller than ever.

The most important factor in the relative attractiveness of employment in different industries is the wage rate. However, actual wage rates in different occupations are hard to compare. They are reported for different units of time ranging from the hour to the month. In the case of farm labor, board and other benefits are given in addition to the money payment. We also have no statistics on hours and seasons of employment. For all these reasons we must resort to a comparison of the percentage of change in the wage rates for the various industries and ascertain where the rate of increase has been most rapid. Even this does not take account of unemployment. In industry, the part of the entire year for which the laborer is employed is primarily a matter of business conditions, while in agriculture it is mainly a matter of weather and the seasonal nature of the various farm tasks. The laborer's total yearly income may be increased or decreased by changes in business conditions to a much greater degree in industry than in agriculture.

In comparing changes in wages over a period of years in different industries as a means of getting at conditions in these industries, it is important to use as a basis for comparison some year or years in which conditions are as stable as possible, in which the wage rates then existing reflect a relatively settled distribution of labor between the industries. The statistics for the year 1915 indicate that at this period the various industries, including agriculture, were closely in balance with the demand for their products and that the distribution of labor supply between them was reasonably stable. Hence 1915 is made the base year in Table XVI, in which the wages of farm labor are compared with the wages in various industrial occupations in Minnesota during the years 1915 to 1920. (See also Fig. 8.) The farm wage figures are the estimates of the United States Department of Agriculture already referred to (see Table XI), and the other figures are based on the wages of industrial laborers of all grades and classes whose accident compensation cases, to the number of several thousand each year, are passed upon by the State Department of Labor and Industry. The average wages in all non-agricultural industries combined increased in the six years only about half as much as agricultural wages. In certain specific industries, however, such as mining, construction, and metal working, the wage increase has been almost as great as in agriculture. To the

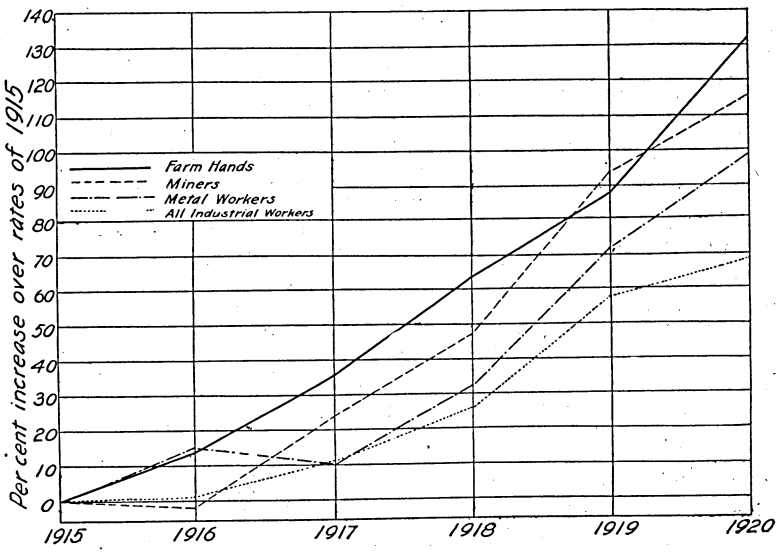

Fig. 8. Comparative Increase in Wage Rates in Minnesota, by Occupations, 1915-1920

Farm wages rose more rapidly for the most part than industrial wages, but the gross income of farm hands probably increased less than that of industrial workers because of the greatly increased working time of the latter.

non-agricultural wages must be added payment for a large amount of overtime in the period of expansion, and a still larger allowance for greater regularity of employment. In normal times, unemployment in many leading industries runs as high as 25 per cent of the working days of the year. This was reduced almost to nothing during the period of industrial expansion.

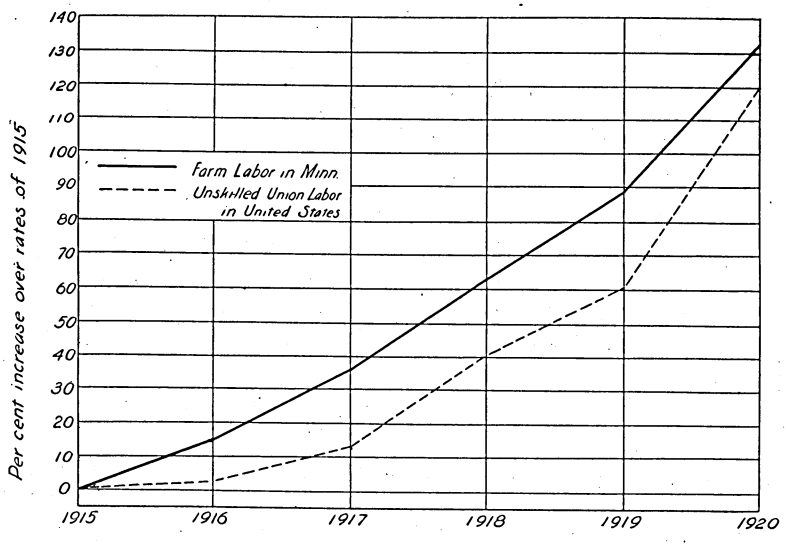

Fig. 9. Increase in Farm Wages in Minnesota Compared with Those of Unskilled Laborers, Average for the United States, 1915-1920

Farm wages rose more rapidly than the others until 1919. Thereafter industrial wages rose more rapidly because of greater prosperity in fields other than agriculture. (See Fig. 10.) Increase in employment time caused the gross income of the union laborers to rise more rapidly than the curve indicates.

Table XVII gives wage data for the whole United States. It presents the average of union wage scales in certain occupations for the United States covering the period from 1915 to 1920 as reported by the Bureau of Labor Statistics. This table contains wage figures for only those occupations which require either unskilled or but slightly skilled laborers, the supply of which can be quickly recruited by drawing men from other occupations. It will be noted that during the six years in question the wages in all these lines more than doubled. As a matter of fact, they increased much more than the wages of the more skilled workers with whom these men are associated. They did not increase quite so much as farm wages, in Minnesota. To the wage increases given, however, must of course be added allowances for overtime and more regular work. These facts are shown graphically in Figure 9.

TABLE XVI

COMPARISON OF FARM AND OTHER WAGES IN MINNESOTA, 1915–1920

Kind of work and unit	Wage scale						Per cent of 1915 scale					
	1915	1916	1917	1918	1919	1920	1915	1916	1917	1918	1919	1920
General farm work (month)*	$28.80	$33.00	$39.00	$47.10	$53.70	$67.00	100.0	114.6	135.4	163.6	188.0	232.6
Harvest (day)*	2.33	2.55	2.96	3.90	4.30	5.10	100.0	109.4	127.4	167.4	188.0	218.8
Approximate value of board, etc., per month on farm*	13.00	11.70	15.00	15.60	21.30	21.40	100.0	90.0	115.3	120.0	163.8	164.6
Average all non-agricultural Industries (week)†	14.95	15.00	16.64	18.74	23.57	25.20	100.0	100.3	111.3	125.4	157.3	168.5
Mining (week)†	16.00	15.80	19.68	23.54	30.61	34.53	100.0	98.8	123.0	147.1	193.3	215.8
Lumbering (week)†	12.30	11.74	13.77	15.78	20.07	21.36	100.0	95.4	112.0	129.0	162.3	173.6
Construction (week)†	17.60	17.89	19.00	21.54	28.08	34.61	100.0	101.7	108.0	122.4	161.1	196.6
Wood working (week)†	13.65	13.56	14.00	16.91	20.18	24.80	100.0	99.3	102.5	123.8	147.8	181.6
Metals (week)†	13.97	16.13	15.43	18.38	23.93	27.58	100.0	115.4	110.4	131.5	171.3	197.4

* From Monthly Crop Reporter, Bureau of Crop Estimates, U. S. Dept. of Agr.

† From biennial reports of Minnesota Department of Labor and Industry.

TABLE XVII

AVERAGE UNION SCALE OF WAGE RATES PER HOUR IN THE UNITED STATES, 1915–1920

Occupation	Average rates per hour (cents)						Percentage, 1915					
	1915	1916	1917	1918	1919	1920	1915	1916	1917	1918	1919	1920
Building laborers	31.2	32.7	36.1	42.3	48.2	69.8	100	104.8	115.7	135.5	154.4	223.7
Hod carriers	36.5	37.3	41.6	48.7	56.9	82.5	100	102.7	114.6	134.1	156.7	227.2
Plasterers' laborers	41.7	42.9	45.8	52.8	60.1	87.1	100	102.8	109.8	126.6	144.1	208.8
Steam fitters' helpers	32.8	33.1	35.3	40.9	49.0	70.9	100	100.9	107.6	124.6	149.3	216.1
Blacksmiths' helpers	33.7	30.1	28.7	49.2	55.0	66.3	100	104.8	117.4	171.4	191.6	231.0
Machinists' helpers	27.4	29.3	32.3	41.1	46.0	57.5	100	105.9	117.8	150.0	167.8	209.8
Average percentage of increase	...	...	...	...	...	...	100	103.8	113.8	140.4	160.7	219.4

In such an analysis, account must be taken of the greater increase in the cost of living in industrial centers as compared with the farm. The normal farm wage contract in most parts of the country includes board, lodging, and frequently washing and mending. A fair comparison of wages, then, even on a percentage of increase basis, is not as between gross money wages, but between the money payment of the farm hand and the net amount the industrial worker has after paying in cash for the things the farm hand receives in kind. The best available statistics indicate that the money cost of living in the city increased somewhat more than 100 per cent between 1915 and 1920. At the same time, farmers' estimates of the cost of boarding hired men, as indicated by the difference between wages with board and without board, reported by the Bureau of Crop Estimates, increased only 65 per cent. Undoubtedly, however, farmers place too low an estimate on the value of these perquisites.

In spite of the greater increase in the cost of living in cities, however, the available data seem to indicate that wages in the industries increased faster than on farms. This conclusion, it must be admitted, makes a large allowance for overtime earnings and decrease in unemployment.

In response to the high wages in the industries, many farm laborers moved to the cities, or entered the industries immediately after demobilization. However, the number thus shifting, tho large enough to aggravate the farm labor shortage, was after all but a small proportion of the whole. The great majority of farm laborers, particularly those hired by the month, are young men reared on farms in the same region where they are working, whose services are not needed on the home farm. Their training and interest unite to keep them in farm work in preference to the unaccustomed and confining work of the shop, the factory, or the mine. Many farm hands have little natural aptitude for skilled shop work. While many industrial jobs are almost wholly mechanical and require little or no previous training, the more highly paid lines of work, and particularly some of the unionized lines, require considerable periods of apprenticeship, and can not be entered on short notice in response to a wage increase. Doubtless the fact that agricultural wages themselves rose rapidly was a primary force in keeping much of the farm labor class in their usual employment.

RELATION OF FARM WAGES TO FARM PROFITS

How have the changes in wages and prices that have accompanied recent phases of the business cycle affected the farmer's profits? How have the other changes affected the farmer's ability to pay wages? To answer these questions we must analyze the farmer's receipts and

expenses, the prices he has received for his products, and the prices he has paid for machinery, supplies and labor. Figure 10 shows the relation that the prices of farm products have maintained throughout the period to the prices of other commodities. The curves are based on the price index figures of the Bureau of Labor Statistics.[12] In these figures the prices for January, 1915, are taken as 100 per cent and the prices for subsequent months are expressed in percentages of this base. The comparison is between the average wholesale prices of agricultural products and the average wholesale prices of all commodities including agricultural products. From the beginning of 1915, agricultural prices rose more rapidly than the average for all commodities and maintained a higher level until the middle of 1919. From that point, the prices of general commodities rose above agricultural prices, and when the downward turn came in May and June, agricultural prices dropped more rapidly than general prices. In short, so far as wholesale prices can reveal it, the sellers of agricultural products had the best of the market during 1915, 1916, 1917, and 1918, but in the recent price decline they have suffered far more than the average sellers. It is true that the prices of some commodities, such as clothing, building materials, and house furnishings, during the latter part of the period of expansion rose much higher above agricultural prices than the general average of prices as indicated in this chart, and suffered much less in the decline; but on the other hand, the prices of such important commodities as metals and metal products, including iron and steel, did not rise as high as agricultural prices, tho in the decline they did not fall so rapidly nor so far.

Figure 10 also throws some additional light on the shortage of farm labor in the spring of 1920. During the actual fighting, farm products were among the most vitally necessary war supplies, while many manufactured products were for the time in but little demand. With the armistice, the anxiety over the food supply was relieved; and with the public danger averted, the regime of saving was relaxed and a reaction of extravagant buying ensued which created a strong demand for manufactured goods, many of which were luxuries or semi-luxuries. Prices on bread grains and a few other farm products continued to rise, tho less rapidly, while livestock prices showed a tendency to decline. In this situation the farmers in the spring of 1920 found themselves in competition for labor with industries whose products had risen in price much more than their own and which could therefore force wages to a level out of the reach of many of the less efficient farmers. Those who were able to hire did so at the risk of a price decline which might wipe out all their profits.

[12] U. S. Dept. of Labor, Bur. of Labor Statistics, Bul. 269, and Monthly Labor Review, May, 1921.

The data on farmers' receipts and costs are by no means complete. For many items of expense, no price figures are available. There are no adequate figures on the increase of rents paid by tenants. The valuation of the farmer's own labor and that of his family, and of the land and equipment which he owned before the changes came, present added problems. Further, there is no accurate information as to changes in the amounts of the different factors of production used as a result of changes in their costs. Enough statistics are available, however, to indicate quite clearly the general trend of farmers' profits during the period.

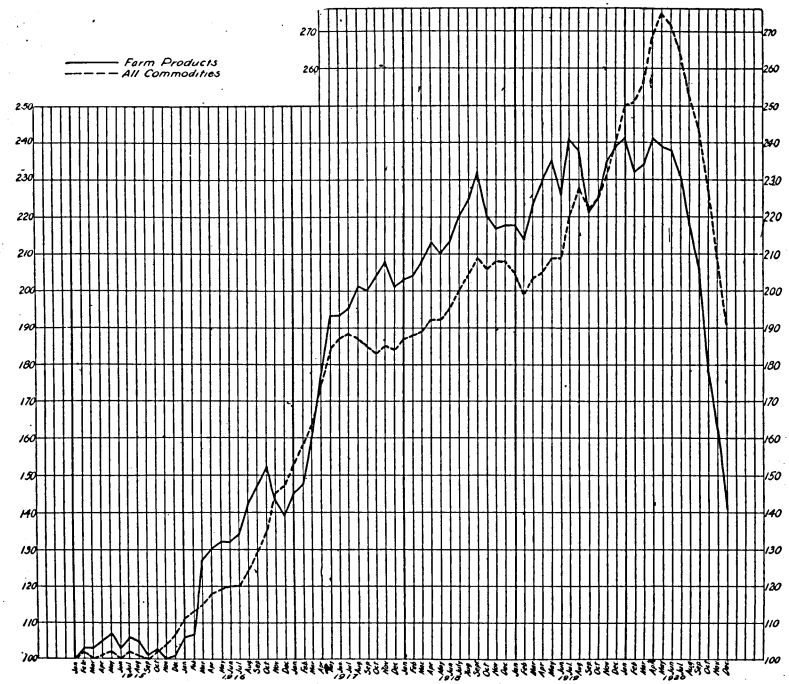

Fig. 10. Wholesale Prices of All Commodities and of Farm Products Compared by Months, 1915-1920

(Bureau of Labor Indexes, prices for January, 1915, taken as base.)

Note that prices of farm products, tho above the level of all commodities from the beginning of 1915 to the end of 1919, did not rise with the latter in 1920, and fell more rapidly when the crisis came.

Table XVIII shows for the United States as a whole the relative rate of change in prices of the things the farmer sells as compared with the prices of things for which he spends his money. (See Fig. 11.) In these figures the prices of each crop and class of livestock are given weight in the averages in proportion to their average importance in the receipts of the farmers of the country for each year. In the same way, the prices of the various articles purchased by the farmer are

given due weight in the average. Things purchased by the farmer include both the things he and his family use directly, as clothing, food, and household furniture, and also the things he buys for use in farming, as feed, seed, fertilizer, machinery, and building material. It will be noted that between 1915 and 1919 the average price of these things increased only 88.7 per cent, and the wages of labor, another important item of expenditure for the farmer, increased only 97.1 per cent, while the price of the two main classes of the things he sells, namely, livestock and crops, advanced 103.7 and 114.6 per cent, respectively. This gain in the prices of farmers' products over the prices of the things for which he spends his money indicates a widened margin of receipts over expenses and consequently larger profits during these five years.

TABLE XVIII

CHANGES IN PRICES OF CERTAIN ITEMS IN FARMERS' RECEIPTS AND EXPENDITURES. AVERAGE FOR THE UNITED STATES, 1915–1920

Items	Per cent of price in 1915					
	1915	1916	1917	1918	1919	1920
Land, value per acre.....	100	110.8	124.4	135.8	164.2	150.4
Labor, per month.....	100	108.5	135.2	167.6	197.1	228.6
Purchases, price.....	100	111.5	136.5	167.4	188.7	199.1
Livestock, price.....	100	117.4	174.1	203.0	203.7	176.0
Crops, price.....	100	131.4	193.3	196.1	214.6	193.1
Crops and livestock, price..	100	120.5	185.2	206.9	212.7	185.3

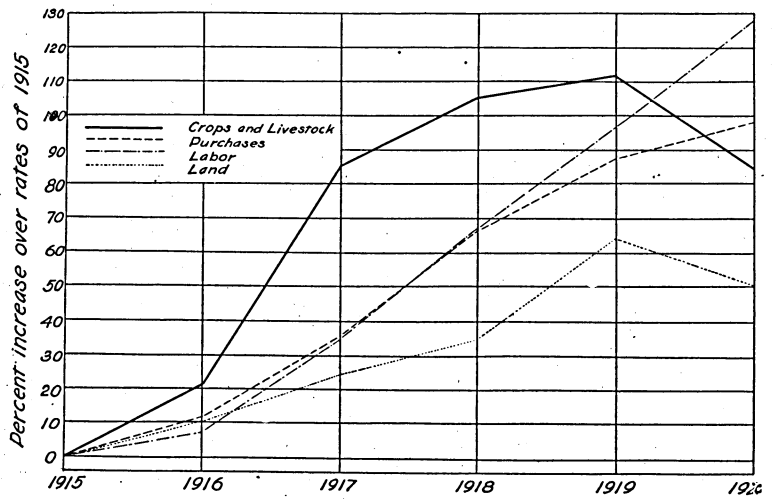

Fig. 11. Prices of Farmers' Products, Purchases, Labor, and Land Compared, United States, 1915-1920

(Bureau of Crop Estimates Prices)

The curves of purchases, labor, and land, which roughly represent farm expenses, in general rose less rapidly up to 1919 than the curve of products, which represents farm receipts. In 1920, conditions were reversed.

To be sure, smaller crops or increased purchases might have kept farmers from realizing these higher profits; but statistics show that while in certain years and in certain localities yields have been low for the country as a whole, production increased rather than diminished during the five years in question. On the other hand, the table shows that in 1920 the percentage figures representing the farmer's expenditures had risen very markedly above the figures for 1919, while those representing his receipts had suffered a sharp decline. The figures of this table bear out the general opinion that the farming class for the country as a whole made very substantial profits during the years 1915 to 1919 in spite of rising costs, but that in 1920 they suffered very serious loss.

The Minnesota figures show the same general conditions. Practically complete figures are available of changes in prices of Minnesota farm products during the period. Table XIX gives the figures collected by the Bureau of Crop Estimates, which are "farm" prices in every case. These figures show a range of increase, as indicated in the right side of the table, from 54 per cent in the case of beef cattle, to 292 per cent in the case of potatoes. As potato prices were abnormally low in the base year of 1915, this latter figure has little significance. However, in the three items of most importance in the farmer's income, wheat, dairy products, and hogs, there were increases of 172, 108, and 187 per cent respectively between 1915 and 1919. In general and with the important exception of beef cattle, the increases were most marked in the cash crops and cash livestock products, and, with the exception of hay, least marked in the feed crops. The figures showing the average percentage of increase indicate that during the five years in question prices steadily advanced, so that in 1919 the average prices received by farmers for their products were more than two and a fourth times as high as in 1915, but that in 1920 the price drop was so great as to reduce the average to only 56 per cent above that of the base year.

Prices, however, are only one factor in the farmer's gross returns. We need also to know how much he had to sell. Figures on yields give us this information as to crops, while the number of animals at the beginning of the year is probably the best available indication as to the relative amounts of livestock and their products that may be sold during the year. Table XX gives yields and value per acre of the leading crops in Minnesota from 1915 to 1920 as collected by the Bureau of Crop Estimates, and Table XXI gives the number of the leading classes of livestock reported as being on hand January 1 of the same years.

TABLE XIX

MINNESOTA FARM PRICES OF THE MORE IMPORTANT AGRICULTURAL PRODUCTS, 1915–1920

Commodities	Prices*						Weight†	Percentage of 1915 price					
	1915	1916	1917	1918	1919	1920		1915	1916	1917	1918	1919	1920
Corn per bu	$0.62	$0.80	$1.10	$1.11	$1.20	$0.51	1.6	100	129	177	179	194	82
Wheat per bu	0.92	1.62	2.02	2.04	2.50	1.30	30.0	100	176	220	222	272	141
Oats per bu	0.32	0.47	0.63	0.63	0.64	0.36	3.6	100	147	197	197	200	112
Barley per bu	0.49	0.87	1.11	0.80	1.16	0.62	4.0	100	178	227	163	237	126
Rye per bu	0.81	1.27	1.67	1.50	1.30	1.22	..	100	157	206	185	160	150
Flax per bu	1.76	2.40	2.96	3.41	4.45	1.83	2.5	100	137	173	194	253	104
Potatoes per bu	0.39	1.30	0.91	0.75	1.53	0.80	..	100	337	233	192	392	205
Hay (tame) per ton	6.40	7.00	12.10	14.10	14.50	11.20	..	100	109	187	220	227	175
Butter per lb	0.26	0.29	0.38	0.40	0.54	0.57	15.0	100	112	146	154	208	219
Eggs per dozen	0.16	0.17	0.26	0.30	0.33	0.36	7.0	100	106	163	187	206	225
Beef cattle per cwt	5.00	5.80	7.30	7.70	7.70	5.00	9.0	100	116	146	154	154	100
Swine per cwt	5.60	8.80	16.10	16.10	12.60	9.00	12.0	100	157	287	287	225	160
Dairy cows per head	58.10	58.70	68.00	81.10	85.30	90.20	..	100	101	117	139	147	155
Horses per head	148.00	145.00	142.00	145.00	133.00	131.00	..	100	98	96	98	90	88
Average per cent	...	...	...	...	...	...	..	100	147	201	206	229	156

* The particular prices selected for each product are the ones having most significance for the farmer: the one obtaining when he sells the bulk of his product. The December price was taken for all grains and hay, the December 15 price for beef cattle and swine, the March 15 price for horses and dairy cows, the April 1 price for eggs, and the June average for butter.

† The figures in this column indicate the varying importance given to the several products in making up the average percentage of increase in prices. Those for which no weight is given were not used in making up the average. Most of the weight for corn and other feed crops is included under the various forms of livestock to which they are fed.

TABLE XX

VALUE AND YIELD PER ACRE OF LEADING CROPS IN MINNESOTA, 1915–1919

Crop	Value per acre (dollars)						Yield per acre (bushels)					
	1915	1916	1917	1918	1919	1920	1915	1916	1917	1918	1919	1920
Wheat	12.31	15.30	35.35	42.64	23.50	12.61	17.0	7.6	17.5	20.9	9.4	9.7
Oats	13.76	12.46	23.31	25.83	17.92	13.50	43.0	26.5	37.0	41.0	28.0	37.5
Barley	14.94	16.53	29.97	24.80	23.20	15.50	30.5	19.0	27.0	31.0	20.0	25.0
Rye	15.80	19.05	30.90	30.00	19.50	20.74	19.5	15.0	18.5	20.0	15.0	17.0
Corn	14.26	26.80	33.00	44.40	48.00	19.12	23.0	33.5	30.0	40.0	40.0	37.5
Flax	18.48	20.40	28.02	35.46	37.82	17.38	10.5	8.5	9.5	10.4	8.5	9.5
Potatoes	41.34	78.00	101.91	78.75	133.11	76.00	106.0	60.0	112.0	105.0	87.0	95.0

TABLE XXI

ESTIMATED NUMBER OF LIVESTOCK ON MINNESOTA FARMS ON JANUARY 1, 1915–1920

Class of stock	1915	1916	1917	1918	1919	1920
Milk cows	1,186,000	1,240,000	1,302,000	1,328,000	1,368,000	1,395,000
Other cattle	1,208,000	1,275,000	1,400,000	1,600,000	1,632,000	1,730,000
Swine	1,716,000	1,716,000	2,075,000	2,400,000	2,784,000	2,951,000
Sheep	564,000	536,000	541,000	568,000	642,000	668,000
Horses	872,000	890,000	925,000	944,000	950,000	940,000

These figures show that wheat yields averaged approximately five bushels below normal for the years 1916, 1919, and 1920, and five bushels above normal for the other three years of the period. For all the other crops listed, the yield was fairly uniform throughout the period and very close to normal. The number of livestock in the various classes is estimated to have increased throughout the entire period. No figures are to be had on the number marketed from Minnesota, but the receipts given in Table XXII for Chicago, East St. Louis, Kansas City, Omaha, Sioux City, St. Joseph, and South St. Paul indicate that the farmers of the country had a steadily increasing volume of livestock to dispose of during the period of generally increasing prices. In 1920, however, the receipts fell off decidedly.

TABLE XXII

RECEIPTS OF LIVESTOCK AT SEVEN LEADING MARKETS

Year	Cattle, including calves	Hogs	Sheep
1915	8,689,736	21,031,405	11,160,246
1916	10,238,629	25,345 802	11,639,022
1917	12,421,101	20,945,301	10,017,353
1918	14,297,855	25,461,514	12,064,416
1919	13,841,651	25,280,245	14,307,503
1920	11,973,681	22,433,301	11,117,479

With practically normal crop yields from a slightly increasing total acreage, and an expanding volume of livestock and livestock products to dispose of, the average gross receipts of Minnesota farmers were greatly increased by the rapidly mounting prices of the period from 1915 to 1919. Particularly for the years 1917, 1918, and 1919, receipts were very high.

The leading three items of expense in farming are, in order of their importance, rent of land, wages of labor, and expense of using machinery. In addition to these, feeds and fertilizer are bought, and other minor supplies. No comprehensive figures are available on the rent of land. The Bureau of Crop Estimates reports annually on the value of land by states. Table XXIII gives the figures for Minnesota for farm lands, including their improvements. If rent and land values always kept together, these figures would indicate that rents rose 90 per cent in the six years in question. In all probability, the increase in rent has been at least as great as that of land value, but we have no assurance of this and therefore are not justified in using the figure as a positive indication of the change in rent in a comparison of farm receipts and expenses.

TABLE XXIII

AVERAGE VALUE PER ACRE OF MINNESOTA FARM LANDS, 1915–1920

	1915	1916	1917	1918	1919	1920
Price	$65	$70	$83	$87	$94	$124
Per cent of 1915 price	100.0	107.7	121.5	133.8	144.8	190.1

The annual cost of using farm machinery, including repairs, interest on investment, and depreciation, has been placed, as the result of numerous investigations, at 20 per cent of its inventory value. On this basis, changes in the price of representative machines would reflect with sufficient accuracy changes in the cost of using machinery. Table XXIV shows the wholesale Minneapolis price of a selected group of commonly used implements during the last six years. It also shows the sum of these prices and the percentage of change in this sum in each year. The retail prices paid by farmers is commonly about 25 per cent over wholesale prices.

TABLE XXIV

WHOLESALE PRICES OF CERTAIN REPRESENTATIVE FARM IMPLEMENTS, AND PERCENTAGE OF CHANGE IN TOTAL PRICE, 1915–1920

Implements	1915	1916	1917	1918	1919	1920
Binder, 7 ft. cut	$117.50	$118.50	$153.45	$198.50	$198.50	$187.50
Mower, 5 ft. cut	38.00	38.00	49.45	66.00	66.00	63.50
Gang plow, 14-inch	55.50	61.60	75.90	111.00	111.50	111.00
Cultivator, 2-horse rider	24.75	26.40	34.20	51.00	51.25	51.00
Harrow, 20 ft.	25.00	27.50	26.40	38.00	43.50	40.00
Drill, 10 ft.	92.00	93.45	112.20	152.00	152.75	152.75
Wagon, 3¼ x 10	73.50	77.15	86.90	123.75	138.50	138.50
Collective price	426.25	442.60	538.50	740.25	762.00	744.25
Per cent of 1915 price	100	104	126	174	179	177

Taking the percentage of increase in the prices of machinery as given in Table XXIV and the percentage of increase in wages as given in Table XVI and combining them into a weighted average series, we have what may be taken as a rough approximation to the rate of increase of the farm expenses during the period.

TABLE XXV

AVERAGE PERCENTAGE OF INCREASE IN MINNESOTA FARM EXPENSE AS BASED ON LABOR AND MACHINERY COSTS, 1915–1920

	Weights	Percentage increase from rate of 1915					
		1915	1916	1917	1918	1919	1920
Labor	2	100	115	135	164	188	232
Machinery	1	100	104	126	174	179	177
Average	3	100	111	132	167	185	214

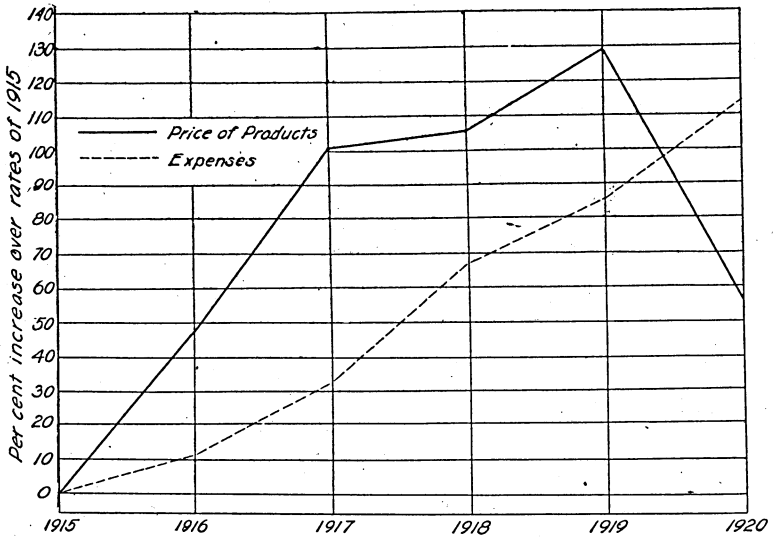

Fig. 12. Prices of Minnesota Farmers' Products Compared with Their Expenses, 1915-1920

These averages and those of Table XIX, representing changes in the prices of farm products, are brought together and presented graphically in Figure 12. It is to be kept in mind in interpreting this figure, (1) that the curves represent merely prices and not total receipts and total expenditures, and (2) that they represent percentage of change in these prices from those of 1915 rather than actual price figures. Assuming that in 1915 the average farmer was getting a margin of profit sufficient to keep him in the business, this margin on the same volume of production was greatly increased in 1916 and still more increased in 1917. That is, during 1916 and 1917 the prices of products were increasing much more rapidly than the expense. With normal yields the farmer's profits under these conditions would be growing larger and larger. In 1918 and 1919, expenses were increasing more rapidly than the prices of products, but did not increase rapidly enough to catch up; that is, prices of products were still much higher in proportion

to expenses than they were in 1915, and assuming normal yields, profits were still large in those years. But in 1920, with expenses still rising and prices falling so disastrously, losses were very heavy. Doubtless many farmers reduced their expenditures to some extent in 1920, so that their losses were not so serious as the price and cost lines in Figure 12 would indicate. Many refused to pay the high wages asked in the spring of 1920. Others dismissed their laborers or succeeded in reducing their wages when prices began to fall. There is little evidence that the farmers as a class understood the nature of the business cycle and foresaw the great fall of prices. They did, however, realize that with wages at such a high level, and crop failures always threatening, they were in great danger of coming out with a loss.

The effect on the farmer's profits of the tremendous price changes of the last six years raises the question of the degree to which he is able to take advantage of rising prices through an expansion of his business, and to protect himself from loss by contraction when a price decline is impending. The most outstanding obstacle to both expansion and contraction is the difficulty—in a well-settled mature agricultural community—of increasing or decreasing the land area of the farm on short notice. It is possible to hire additional labor and then to dismiss it, or to buy additional equipment and supplies when conditions make expansion profitable, but usually all the good farming land is occupied and if the area devoted to one crop is increased, it is at the expense of some other crop. Therefore, expansion in the farm business under the stimulus of rising prices must normally take the direction of greater intensity in the cultivation of land either by shifting to more intensive crops or putting more expenditure on the limited areas of the old crops. This means that the farmer may encounter diminishing returns not only from management but from the land. Figures previously quoted (see Table XIV) indicate that farmers during the time of rapidly rising prices were seeking to extend their use of labor, and it is common knowledge that they bought more equipment in the form of larger implements and tractors. It is equally evident from the figures referred to that they are now hiring less labor and doubtless many of them would like to dispose of a part of their equipment if they could do it without too great sacrifice. It seems evident, then, that the farmer does expand and contract his business in response to price and cost changes, altho the nature of his business probably sets somewhat closer limits on this adjustment than is true in most lines of merchandising and manufacture. It is quite obvious, also, that these limitations affect his bidding for labor by making the farm demand for labor increase much less in a period of prosperity than the demand from other industries.